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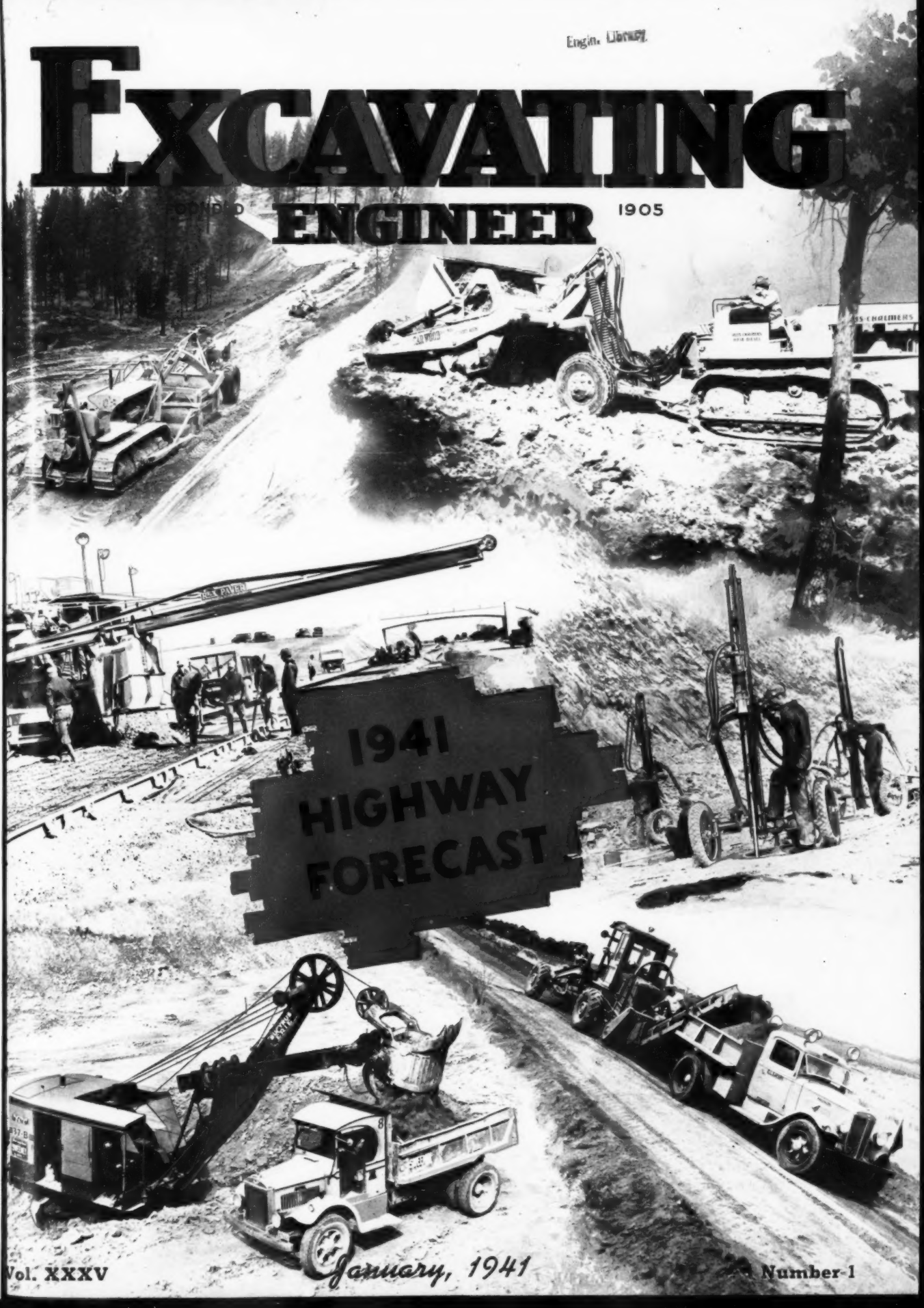


Vol. XXXV January, 1941 Number 1

SAFETY *first* . . . ECONOMY *always*

with

BUCYRUS ERIE

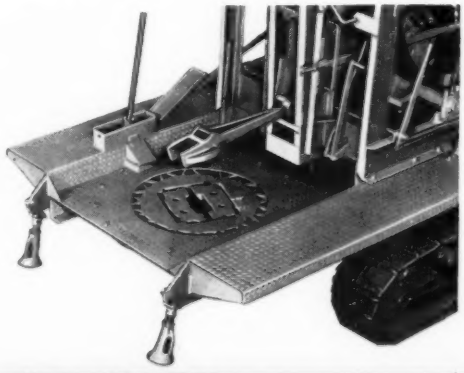
MODERN BLAST HOLE DRILLS

Operators "take to" the new large platform and built-in tool wrench found on modern Bucyrus-Erie blast hole drills. And well they should, for every thought for safety as well as efficiency was considered when Bucyrus-Erie engineers, with 73 years of successful drill designing to their credit, planned this new feature.

They built a large platform, big enough to allow ample room for a couple of pairs of husky shoes to keep out of the way of the bone-crushing weight of heavy tools. Pressed non-skid steel was used for the floor to give *better footing* than any pair of hob nailed boots—And the men work up off the wet ground and out of the muck.

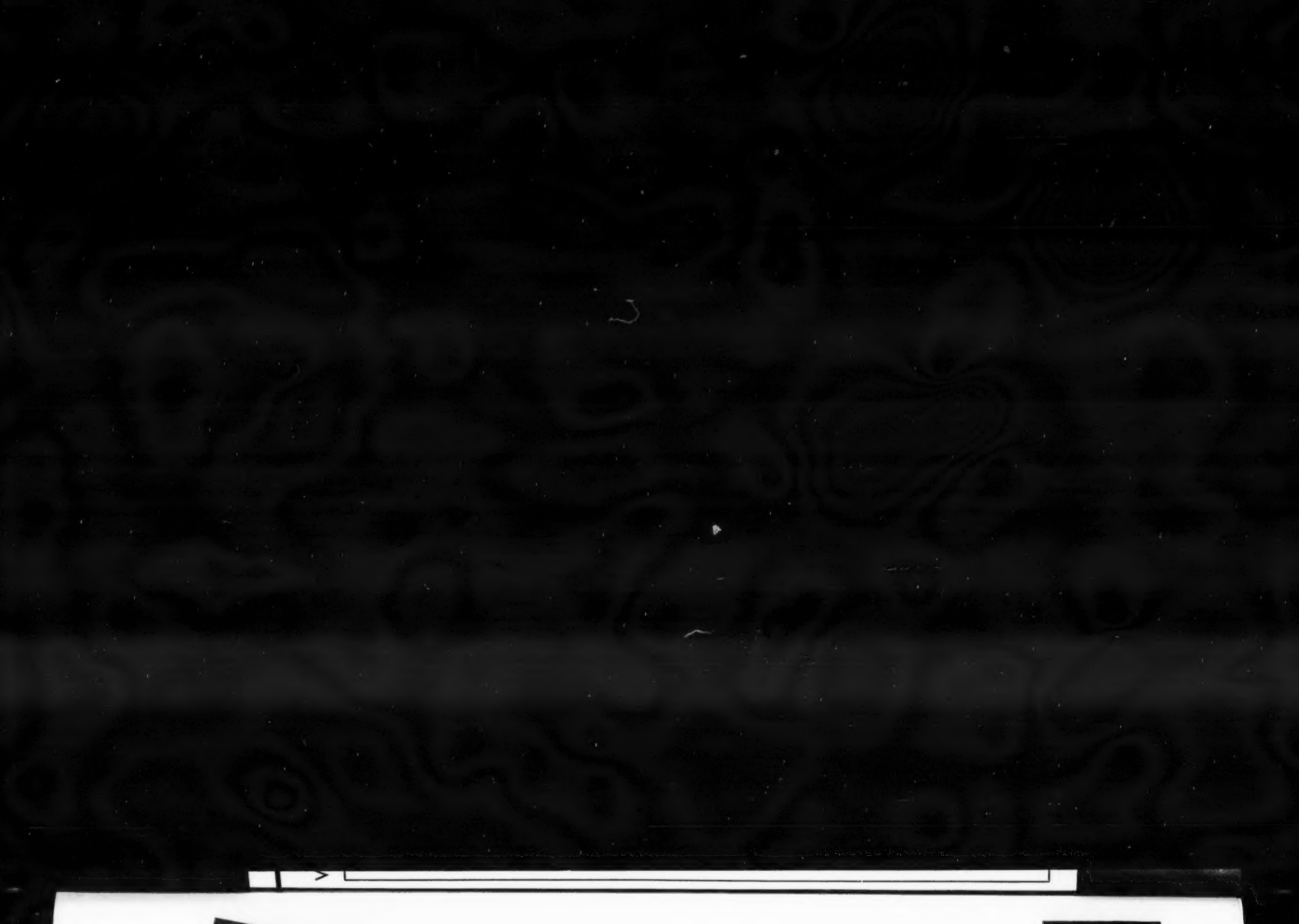
Not only does this important improvement in blast hole drills make drilling safer, but it also makes it faster. The mechanical built-in tool wrench breaks tool joints quickly and eliminates all the back breaking labor and delay involved in handling heavy tool wrenches. This new turning wrench, driven by a bevel-gear drive beneath the operator's platform, is operated by means of an easily worked hand-lever ratchet on the operator's platform (by power on the 42-T). A holding wrench is hinged within the derrick-foot so it can be quickly and easily swung down for use. A common nail serves as a shear pin—when this snaps the joint is tight enough; thus, accurate setting of tool joints is assured.

Built-in tool wrenches are now available on the complete line of Bucyrus-Erie blast hole drilling equipment —the 27-T, 29-T, and 42-T. See for yourself how you can speed up your work, keep sharper tools on your rigs, and help satisfied operators to get the maximum output from modern Bucyrus-Erie drills. Investigate your drilling costs NOW. You'll find modern Bucyrus-Erie drills can save you money.



Bucyrus-Erie

SOUTH MILWAUKEE, WISCONSIN



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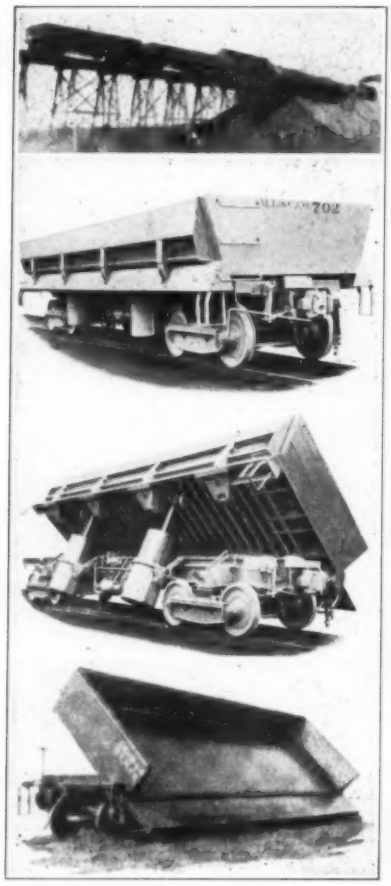
DIFFERENTIAL STEEL CAR CO., Findlay, Ohio



DIFFERENTIAL
AIR DUMP CARS

30-Yd. Capacity with AXLESS Trucks

Lead the field in strength with reduced weight.

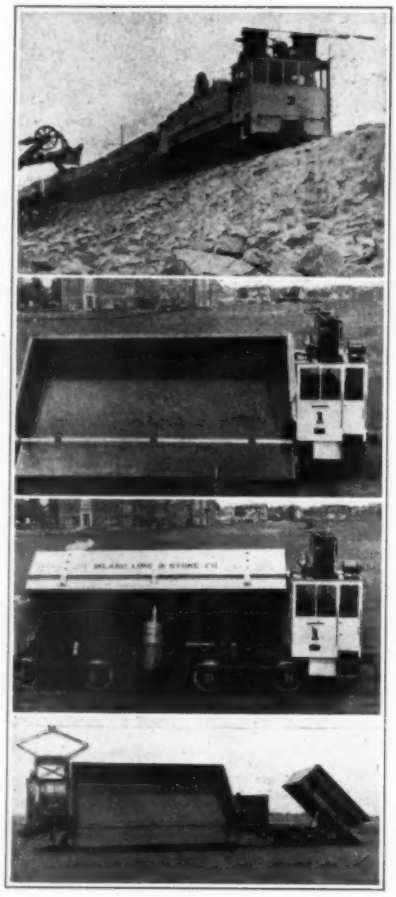
Reduced train resistance and increased pay load per locomotive.

Sticks to the track at higher speeds.

Less Maintenance.

Lower overall cost per ton material hauled.

Other sizes from 50 cu. ft. to 50 cu. yds.



DIFFERENTIAL
ELECTRIC LOCOMOTIVES

30-yd. Capacity
1200 Horse Power

Haul heavy trains up steep grades.

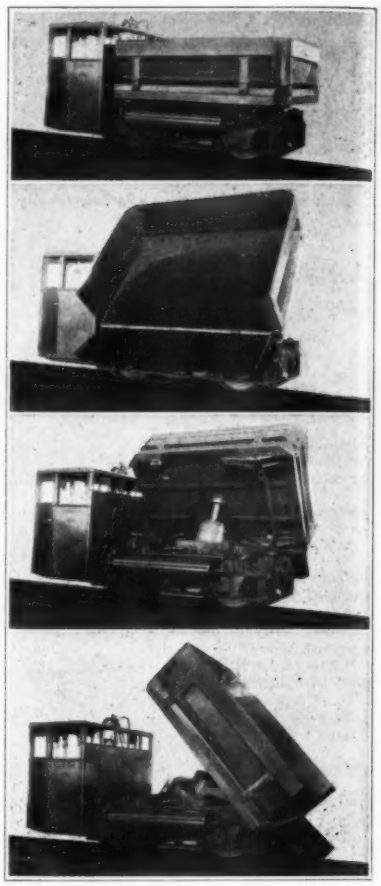
Large pay loads.

Less dead weight.

Low cost transportation.

Pay load ballast increases adhesion for quick acceleration and safety.

Differential burden bearing locomotives reduce haulage costs 20 to 30% due to the pay load on the locomotive.



DIFFERENTIAL
STOCK PILE CAR

Dumps Right, Left and End

180 cu. ft., 12-ton Capacity
15 cu. yd., 25-ton Capacity

Air dump for quick discharge. Makes an 18 ft. width berm at top of rail when side dumping.

When end dumping it will form a 10 ft. width berm and plow the ore level with top of rails.

No trestle required — builds its own dump; or greatly increases capacity under permanent trestle.

3 way and 2 way dump bodies for rubber tired trucks and trailers.

DESIGNERS AND MANUFACTURERS OF

AIR DUMP CARS — MINE CARS — 8 WHEELED MINE LOCOMOTIVES, DIESEL ELECTRIC LOCOMOTIVES
STOCKPILE CARS — ELECTRIC LOCOMOTIVES — COMPLETE HAULAGE SYSTEMS

DIFFERENTIAL LOCOMOTIVE and CAR WORKS, FINDLAY, OHIO

For your convenience in writing to Differential Steel Car Co., you will find a card bound in this issue.

on the line!

extensive production facilities—the reasons why *Built by Buckeye* ✓ is your ironclad guarantee of the most that can be had in dependable performance and worthwhile profits.

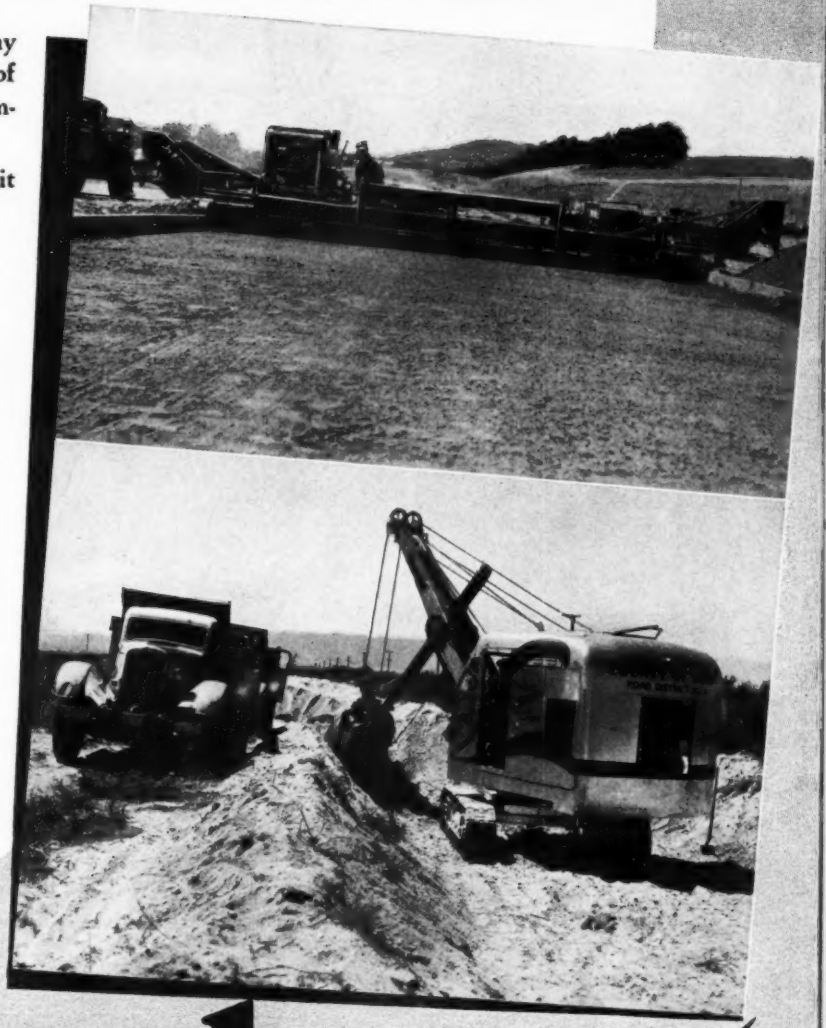
On your construction equipment requirements, it will definitely pay you to check Buckeye first!

mum—puts the grade ***on the payline.*** R-B Finegraders are built up to 24 ft. wide—a model for every job.

✓ **SPREADERS** Buckeye builds the spreader with the transmission-driven spirally fluted feed roll that grips the material and distributes it accurately and uniformly right where you want it. Handles sand, chips, gravel—saves time, labor, material, money. Strikeoff attachment permits spreading up to 6 inch course of rock.. Built in 9, 10, 11, and 12 foot widths.

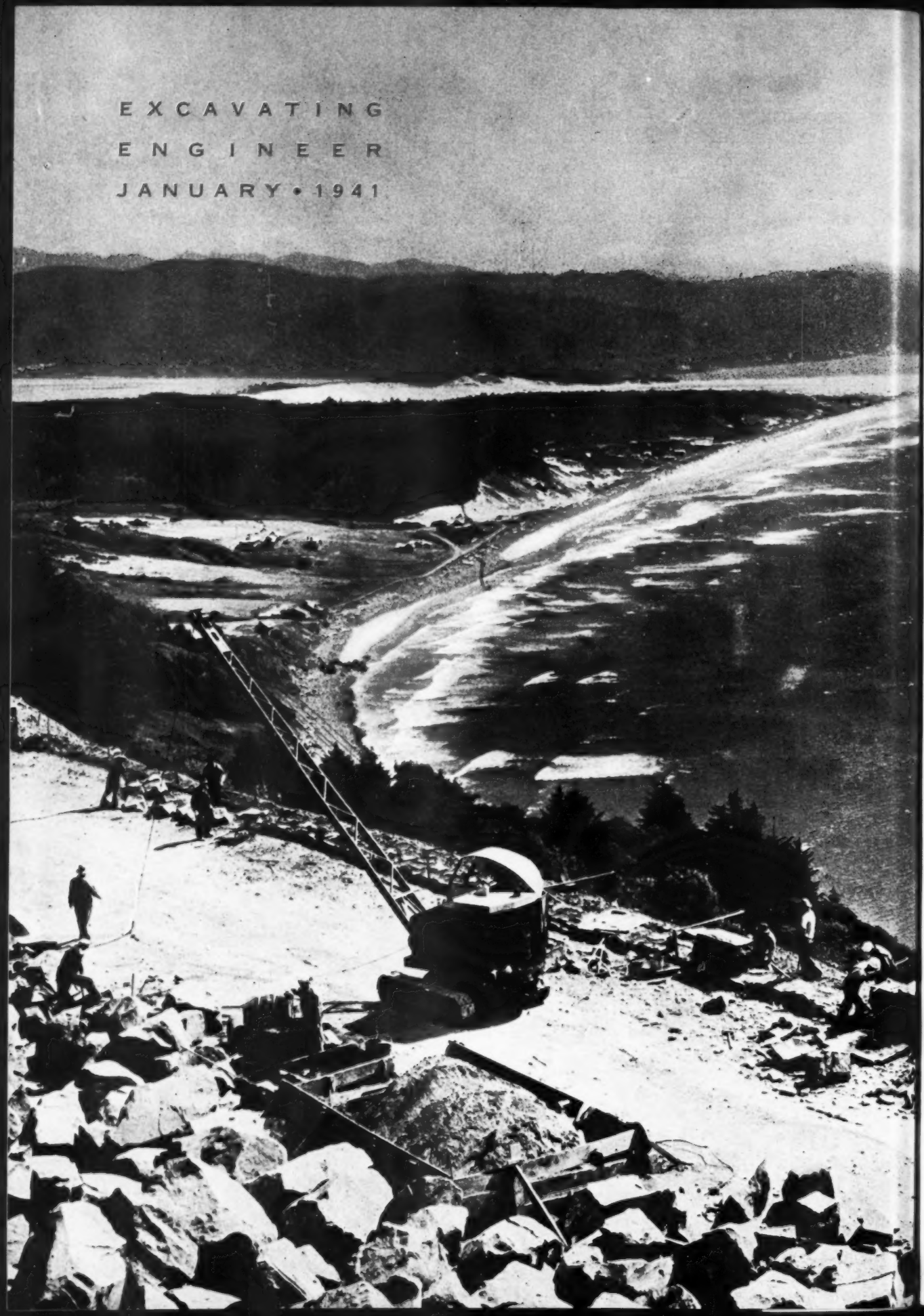
✓ **ROAD WIDENERS** The modern way to dig subgrade widening trench. Cuts a mile or more per day—accurately. "Sparks" the whole job. Reduces loss of yield to a minimum. Built in two sizes: 16-R-2 cuts 12″ to 33″ wide trench up to 12″ deep; 16-R-4 cuts 12″ to 48″ wide trench up to 12″ deep.

✓ **TRACTOR EQUIPMENT** Buckeye Cable Controlled Bulldozers and Trailbuilders dig their own way in and "roll" the dirt ahead—big payload, high yardage per day. Buckeye G-L-T Hoists give lightning-fast action smoothly and evenly for faster earth moving.



Built by Buckeye ✓

BUCKEYE TRACTION DITCHER COMPANY • *Findlay, Ohio*


EXCAVATING
ENGINEER
JANUARY • 1941

1941 Highway Forecast

EXCAVATING ENGINEER'S annual highway forecast, based on a survey of forty-eight state highway departments and the District of Columbia, is presented on the following pages in state-by-state order.

A brief analysis of these figures points to a continued rise in state road building activity for the coming year. Reports from forty-eight states resulted in complete returns from thirty states which were able to give definite 1941 highway allotments at press time. They report total 1941 construction funds available at $288,775,311, with maintenance monies totalling $114,816,758. Complete highway department expenditures for 1941 are estimated by these thirty states at $429,020,711. These estimates by states controlling 62.1% of the United States' total road mileage are 13% over 1940 allotments.

Present defense plans point to further highway expenditures aside from that already alloted to the states as Federal aid. Most regular 1941 road money will not be diverted to defense highway projects, as the states have already made matching contributions on roads needed for normal traffic purposes. This problem will have to be solved either through new appropriations or the reallocation of existing road money.

Although they are an important part of present defense preparations, roads are not the only job calling for the services of the dirt moving contractors. Airports, cantonments, industrial plant expansion, and new railways are also important items on the contractors' "work-to-be-done" list.

● Left: Rock for a rubble masonry wall along the Oregon coast highway (U. S. 101) is put into place with a sling swung from a Bucyrus-Erie 10-B.

A recent Dodge report (see page 33, this issue) sets the total figure for 1941 construction in thirty-seven states at $4,400,000,000, a 14 per cent increase over 1940 expenditures.

War defense activity, of course, is responsible for the major portion of this increase. Public works and utilities, industrial plant construction, and public and private residential construction are all expected to increase their 1941 expenditures substantially.

Access roads to link the Army and Navy's new cantonments, airports, defense industries, etc., are the United States' No. 1 need at present. Federal Works Administrator John M. Carmody in a recent speech estimated that an expenditure of $194,000,000 will be needed to construct and improve 2,900 miles of access roads necessary to connect the various military and naval establishments properly.

The Public Roads Administration and the Work Projects Administration are already cooperating with the U. S. War Department in organizing formal conferences throughout the country to determine the specific access roads and streets needed at the site of each military establishment and each defense industry, the approximate cost of these improvements, and the money available from different federal, state, and local agencies for construction.

However, war or peace, Uncle Sam needs roads. Whether state or federal built, they form a part of that great network of steel and stone that binds this great nation together. Whether they are destined to carry the varied traffic of normal peacetime industry or the rumbling guns of Uncle Sam, they are an essential investment for America's future in an increasingly competitive world.

State-by-State FORECAST

Alabama

Figures on Alabama's 1941 program and a forecast of funds available for 1941 are shown in the following release just received from the Alabama state highway department:

SOURCE OF FUNDS FORECAST
(Fiscal Year ending September 30, 1941)

Cash on hand	$ 385,000.00
Auto license	3,230,000.00
Gasoline tax	7,852,000.00
Motor carrier fees and mileage tax	200,000.00
County Aid	196,000.00
Federal Aid—	
Regular	2,620,000.00
Secondary	566,000.00
Grade crossing	959,000.00
Works Program and N.I.R.A.	108,000.00
Total	$16,116,000.00

DISBURSEMENTS

Debt service (interest and retirement)	$ 3,957,000.00
Administration	500,000.00
Maintenance	2,500,000.00
Advice and assistance to others	100,000.00
Purchase and replacement of equipment	300,000.00
Construction	8,300,000.00
Contingencies	200,000.00
Tax commission expense	125,000.00
Total	$15,982,000.00

Alabama state highway department's bituminous road construction projects consisted of 408 miles of mat, 138 miles of liquid seal, and 280 miles of plant mix seal.

The department completed the construction of three major bridge projects — one over the Alabama River at Selma, one over the Tennessee River at Florence, one over the Tallapoosa River at Tallassee —constituting a mileage of about 4.3 miles of bridges. Also completed were 647 miles of grading and drainage, 85 miles of temporary surface, 10 miles of paving other than bituminous, in addition to other minor construction paving projects.

The accomplishments by the division of maintenance of the state highway department, according to recent report from the Public Roads Administration, indicate that maintenance conditions for the entire Federal Aid system and state highway reports indicate that the entire state system of highways are rapidly becoming a well-maintained system of roads, as these reports indicate much improvement over the past several years.

It is estimated that there will be a slight decrease of mileage in the various types of road construction for the year ending September 30, 1941, as compared to the year ending September 30, 1940, caused by the high standards of construction being effected during the year being forecast.

Arizona

Showing an increase of 9.7% over 1940 expenditures, Arizona's budget includes approximately $4,477,717 for construction during 1941, plus $1,500,000 for maintenance and $1,187,948 for other highway department expenditures.

Sources of the $7,165,665 fund expected to be available for the 1941 program are: Federal Aid funds accounting for 22.85%; other Federal funds, 9.99%; state gas tax, 48.40% and 18.76% from license fees and other income.

Heading the list under the $4,477,717 construction program as reported by F. N. Grant, deputy highway engineer, is a proposed 180 miles of grading estimated to cost $1,800,000 and involving 2,500,000 yards. Surfacing 280 miles, gravel or crushed stone, is allotted $842,000 and will require approximately 1,400,000 tons of material. 50 miles of oil treatment is included at $75,000, plus 10 miles of high type paving at $300,000 and 220 miles of low type paving at $1,100,000. Six bridges are proposed at a total cost of $360,000. In addition, a previous award of $370,000 for 620,000 cubic yards of highway excavation will be carried over into 1941.

During 1940, the state equipment purchases totalled $258,000 and rental cost amounted to approximately $25,000. No diversion of highway funds for other uses was made during 1940.

Arkansas

Information regarding the 1941 program is not as yet ready for release. A resume of work placed under contract by the highway commission during 1940, however, shows that a total of $3,022,841 in contract commitments was made during the year.

This sum covered 15 miles of high type paving, 125 miles of bituminous surfacing (road mix or equivalent), 28 miles of untreated gravel surfacing and 4,013

• John Burman & Sons use a Caterpillar - powered LeTourneau scraper on their coastal highway realigning job near Point Arena, California.

FEDERAL AID HIGHWAY PROJECTS

AS OF OCTOBER 31, 1940

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	$ 1,761,824	$ 876,167	49.3	$ 5,845,388	$ 2,906,953	220.1	$ 1,187,040	$ 590,890	47.5	$ 1,871,145
Arizona	1,026,203	680,107	47.7	887,592	565,761	51.3	717,770	357,416	16.6	1,008,472
Arkansas	3,523,589	1,629,159	76.7	1,785,607	886,895	78.0	467,546	233,127	26.1	288,879
California	3,584,812	1,876,157	70.2	8,014,486	4,136,279	113.4	2,609,316	1,415,170	56.4	1,347,487
Colorado	1,676,370	923,229	127.7	2,245,258	1,265,427	112.3	255,540	144,023	69.0	2,026,469
Connecticut	590,590	293,455	5.4	2,274,635	1,101,846	19.1	258,052	125,674	3.0	988,696
Delaware	95,119	47,559	2.9	1,927,523	962,982	29.6	155,407	51,044		1,048,125
Florida	943,913	471,956	25.7	3,020,271	1,499,856	91.2	840,971	420,485	17.4	2,313,581
Georgia	1,790,959	887,744	111.7	7,861,815	3,931,408	311.4	2,387,793	1,193,896	118.8	4,666,842
Idaho	1,203,714	739,131	120.2	925,031	568,325	65.1	534,222	266,364	27.2	1,345,450
Illinois	3,838,419	1,896,919	84.5	8,094,016	4,046,843	165.6	2,887,476	1,218,238	93.6	2,132,561
Indiana	2,389,929	1,191,906	61.1	7,654,685	3,677,186	129.9	2,195,394	1,065,542	32.8	890,064
Iowa	3,086,933	1,396,940	100.5	4,919,428	2,251,662	168.2	2,080,631	977,816	69.5	164,273
Kansas	2,079,065	1,038,203	152.2	6,454,040	3,225,946	427.2	2,981,227	1,490,612	181.2	2,973,201
Kentucky	1,785,343	888,277	35.0	3,487,071	1,743,535	107.4	576,781	288,390	38.0	2,907,597
Louisiana	643,730	316,311	5.4	12,506,169	3,302,037	64.7	1,377,511	681,067	37.7	2,869,293
Maine	1,003,748	496,030	20.3	1,025,511	512,755	29.3	18,200	9,100	.6	620,911
Maryland	575,000	287,500	10.2	3,463,558	1,723,362	40.1	489,303	244,651	5.1	1,233,790
Massachusetts	986,611	492,229	9.9	3,102,023	1,543,536	26.1	4,950	2,475		2,990,700
Michigan	2,363,181	1,126,875	84.2	11,128,168	5,465,734	305.7	1,053,463	471,732	35.4	284,629
Minnesota	3,256,423	1,572,971	289.3	6,599,256	3,292,517	392.4	577,421	288,711	27.1	3,135,632
Mississippi	1,231,532	508,478	43.3	6,646,274	3,006,631	333.6	2,026,160	990,330	119.7	1,295,200
Missouri	2,498,269	1,249,062	130.4	7,608,884	3,476,421	194.2	3,576,503	1,319,892	119.4	3,518,941
Montana	3,783,198	2,145,589	255.7	2,104,985	1,187,884	129.5	644,474	363,677	29.5	3,152,825
Nebraska	2,914,534	1,452,684	331.6	5,247,037	2,540,265	621.9	1,686,449	843,224	180.7	2,013,243
Nevada	1,404,260	1,208,281	74.6	1,166,186	1,015,652	48.5	9,615	8,381	.2	756,831
New Hampshire	642,060	314,046	18.4	1,220,387	599,658	27.1				904,754
New Jersey	1,126,220	562,820	8.9	4,595,830	2,297,915	32.9	1,047,230	523,615	5.5	1,610,075
New Mexico	1,327,401	817,541	123.7	1,827,559	1,109,792	92.7	343,273	206,925	7.1	970,729
New York	4,332,626	2,133,608	88.7	16,837,591	8,172,935	224.4	2,248,227	989,209	31.2	328,817
North Carolina	3,327,539	1,662,772	165.4	4,814,917	2,407,375	232.2	765,020	366,115	27.9	1,328,590
North Dakota	1,322,620	719,223	134.4	3,079,856	1,704,036	245.7	2,483,624	1,261,570	201.6	3,215,741
Ohio	1,805,773	902,886	23.8	13,736,202	6,843,772	126.5	4,005,118	2,001,379	32.8	3,709,535
Oklahoma	1,496,092	793,964	72.4	3,340,533	1,764,846	106.3	1,063,885	511,530	42.6	4,015,103
Oregon	2,668,746	1,592,001	135.0	1,962,173	1,175,844	40.6	1,328,524	613,810	36.8	625,580
Pennsylvania	2,894,188	1,419,755	40.7	12,775,559	6,344,434	117.9	2,636,166	1,305,860	25.8	2,099,685
Rhode Island	573,613	286,190	4.7	1,190,347	594,172	12.9	497,325	248,330	3.6	747,071
South Carolina	805,047	385,103	46.5	2,319,020	1,118,158	166.5	933,689	416,210	69.6	2,150,306
South Dakota	2,174,510	1,217,052	330.5	4,296,190	2,598,660	600.3	1,234,280	774,350	178.0	2,057,833
Tennessee	1,487,471	738,520	32.4	3,767,502	1,883,751	130.9	523,998	261,999	16.8	3,690,328
Texas	6,014,902	2,967,937	383.1	6,903,032	3,425,362	308.3	3,914,199	1,854,235	163.8	5,163,273
Utah	797,848	581,181	58.8	904,910	677,622	46.8	630,615	240,560	14.9	735,206
Vermont	648,589	324,295	23.3	1,119,784	558,005	29.2	250,623	125,312	5.0	272,018
Virginia	1,568,149	747,427	48.7	3,909,259	1,882,228	73.9	809,254	402,834	17.2	1,072,621
Washington	2,250,340	1,184,481	43.7	3,060,584	1,622,135	62.2	52,315	27,900	1.2	799,736
West Virginia	1,304,780	648,925	38.1	3,068,345	1,527,971	88.6	419,199	209,600	10.2	1,628,167
Wisconsin	3,602,500	1,753,281	112.9	3,567,914	1,771,735	153.9	436,907	212,894	13.1	3,240,854
Wyoming	1,378,588	868,610	162.3	945,228	600,017	95.1	487,651	311,701	58.8	667,543
District of Columbia	224,000	112,000	1.6	314,242	157,121	2.9	250,100	117,016	1.5	337,231
Hawaii	95,573	44,205	1.7	605,628	304,762	8.9	228,633	114,161	3.9	1,498,907
Puerto Rico	20,338	9,980	.2	1,704,384	843,290	27.6				717,500
TOTALS	93,952,721	48,480,722	4,425.6	227,863,873	111,823,294	7,330.4	58,189,070	28,159,042	2,321.4	91,432,020

• Left: This traffic circle on Canada's 91-mile Queen Elizabeth Way safely solved the crossing problem of two highways and a railroad near Burlington, Ontario. Below: These stair-stepped banks of Loess soil through an 80-foot cut on Iowa's Highway 157 have created wide interest among roadbuilders.

• Above: One-lane view of Connecticut's famed Merritt Parkway near Stratford. Above, center: Newly reconstructed section of the Louisquisset Pike between Providence and Woonsocket, Rhode Island. Right: Picturesque section of Colorado's outstanding 1940 road job, a 28-mile stretch on U. S. 50.

lineal feet of major bridge construction.

The construction program for the 1940 calendar year was financed with Federal funds made available through toll bridge reimbursement accomplished by action of the state in freeing all state-owned and operated toll bridges in the spring of 1938. The funds involved were in the following amounts.

Regular Federal Aid	$1,955,000
Secondary Federal Aid	255,000
	$2,210,000

Grade Crossing Separation and Protection funds apportioned to the State from Federal sources, and not requiring matching, amounted to $510,000. This sum, together with accrued balance allowed contract commitments in the total of $775,998, thus financing the construction of five separation structures, two relocation projects and twelve railroad crossing protection devices.

California

Estimates furnished by officials of California's Division of Highways, covering the fiscal biennium between July 1, 1941 and June 30, 1943, indicate that over $90,000,000 will be available to the division for the two year period, exclusive of Federal grade crossing and secondary or feeder funds.

In detail, present estimates show:

Source	Amount
State's and cities' 2-cent share of the 3-cent gasoline tax	$73,000,000
State's ½ of net revenue from motor vehic'e fees	8,474,000
Use fuel tax (other than gasoline)	1,300,000
Regular Federal Aid apportionments	7,600,000
Caravan fees	226,000
Total revenue 7-1-41 to 6-30-43	$90,600,000

It is expected that this amount will be allotted to highway work in the following amounts:

¼ cent gas tax to city streets not on state highway system	$ 9,125,000
Maintenance	18,400,000
Shops, equipment and buildings	700,000
Highway planning survey	210,000
Construction and improvement	57,940,000
Administration	3,900,000
Traffic engineering and investigation	325,000
Total	$90,600,000

The amount of $57,940,000 allotted to construction and improvement of the state highway system for the coming biennium will be allocated in approximately the following amounts:

¼ cent gas tax to state routes in cities	$ 9,125,000
Right of way and engineering	10,540,000

• Idle truck loading time is eliminated by the use of this Brooks "Load Lugger" where hand loading is required. Detachable dump buckets are spotted at convenient points on the job and loaded while the truck is making a trip with a full bucket.

Joint highway districts	200,000
Construction projects and contingency	38,075,000
Total	$57,940,000

In addition to the above it is anticipated that California will receive some $1,480,000 in Federal Aid grade crossing elimination funds and $1,330,000 in Federal Aid secondary or feeder funds.

The figure of greatest interest to the construction industry in the above break-down of the proposed budgetary amounts is that of $38,075,000 for Construction Projects and Contingencies. It is from these funds that major construction will be let to contract.

Accomplishments of the California Division of Highways for 1940 may be gauged by the following brief tabulation of work placed under way during the year:

Major construction contracts	$16,449,600
Minor improvements, betterments and day labor	4,870,000
Assistance to City of Los Angeles for improvements to state routes with WPA and PWA funds	1,822,000
Right of way and engineering	4,755,000
Total (Jan. 1, 1940 to Dec. 31, 1940)	$27,896,600

The $16,449,600 allotted for contract construction provided for the following types of improvement:

Type	Miles
Grade and pave	46.8
Grade and plant-mix surface	149.8
Grade and road-mix surface	62.2
Grade and road-mix surface treatment	111.6
Armor coat and seal coat	281.8
Grading only	39.3
Shoulder improvement only	17.3
Bridges and grade separations	(65)

Colorado

Although Colorado's highway budget will not be made up until a meeting of the State Highway Advisory Board with the governor and state highway engineer, which is scheduled too late for publication of results here, a forecast furnished by W. M. Williams, director of publicity, indicates an increase of approximately 10% over 1940 expenditures.

Included in the total of $8,200,000 expected to be available in 1941 is the sum of $5,900,000 for construction, $1,500,000 for maintenance and other expenditures of the highway department amounting to $800,000.

Payment of these expenditures will be made out of income derived from $2,572,000 in regular Federal Aid and $251,000 in Federal grade crossing funds, plus $4,377,000 from state gas revenue and $1,000,000 in license fees and other income.

Figures on proposed construction are not complete, but preliminary estimates show that approximately $4,850,000 has been set aside for 160 miles of grading and surfacing, including bridges. Some 500 miles of oil treatment surfacing is also contemplated at an estimated cost of $1,050,000.

Mr. Williams reports that the state spent approximately $200,000 on equipment purchases in 1940 and there was no diversion of highway funds in the state during the year.

Connecticut

With the 1941 budget awaiting approval by the governor, no fig-

ures on the highway program could be released in time for publication.

A summary of the $13,156,000 in expenditures on projects completed or in progress as of June 30, 1940, shows the following 1940 construction undertakings in the state:

	Miles Completed
Grading	13.52
Surfacing:	
Gravel or crushed stone	68.12
High type paving	49.56
Low type	4.21

1940 equipment purchases totaling $326,430 were reported.

According to government reports covering the fiscal year ending October 31, 1940, Connecticut had completed 5.4 miles of Federal Aid highway projects costing an estimated $590,590, of which $293,455 was provided in Federal Aid.

As of the above date, the state had 19.1 miles under construction which was expected to cost $2,274,635; of this amount, Federal Aid provided $1,101,846. Projects approved for construction involved 3 miles at an estimated $258,052. In Federal secondary or feeder road projects, the state had 4.4 miles under construction to cost approximately $275,614, and 6 grade crossing projects were under construction at an estimated total cost of $517,556.

At the end of October, 1940, the balance of funds available for programmed Federal Aid projects showed $988,696 for highways, $165,242 for secondary or feeder roads, and $449,334 for grade crossing projects.

Delaware

Samuel Knopf, principal assistant engineer, reports that approximately $3,530,000 will be available for Delaware's 1941 road program. An estimated $1,500,000 will be devoted to construction, with $1,000,000 reserved for maintenance and $1,030,000 to cover other expenditures including highway police, license bureau and bonds.

$560,000 in regular Federal Aid and $220,000 from other Federal funds, plus $2,250,000 from state gas taxes and $1,000,000 from license fees and other state income will finance the program.

Proposed construction in 1941 includes:

	Miles	Amount	Quantities Required
Grading only	2	$115,000	150,000 Cu. Yds.
Surfacing, including grading:			
Slag	24.5	162,000	15,000 Tons
Oil treatment	200.0	80,000	1,000,000 Gallons
Paving, high type	32.1	600,000*	
Paving, low type	18.0	158,000	
Bridges—4—cost		358,000	

*Includes cement concrete widenings and resurfacing of concrete roads with bituminous concrete.

About 3,000 yards of highway excavation previously awarded at $1500 will be carried over. State equipment purchases totalling approximately $60,000 are reported for 1940.

District of Columbia

Expected funds available for highway use during 1941 are reported by H. C. Whitehurst, director of highways, to total approximately $6,227,682, an increase of 9% over the 1940 expenditures.

Included in the 1941 budget is $3,711,250 for construction, $905,000 for maintenance and $1,611,432 for other highway department expenditures. No further breakdown of 1941 allotments is available at this time.

Major source of the 1941 funds will be gas tax revenue, from which approximately $3,054,500 is

(Continued on page 44)

● **Above: Start of operations in a large cut on Wisconsin's highway No. 11 between Hazel Green and East Dubuque Road. Below: Completed 80-foot rock cut at the same location.**

FEDERAL AID SECONDARY OR FEEDER ROAD PROJECTS

AS OF OCTOBER 31, 1940

STATE	COMPLETED DURING CURRENT FISCAL YEAR			UNDER CONSTRUCTION			APPROVED FOR CONSTRUCTION			BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	Estimated Total Cost	Federal Aid	Miles	
Alabama	$ 175,144	$ 87,363	9.4	$ 1,276,990	$ 635,975	60.7	$ 37,167	$ 18,583		$ 358,928
Arizona	97,773	49,619	10.5	249,237	179,933	8.1				231,780
Arkansas	358,381	158,811	14.6	306,339	152,958	20.6	105,323	70,125	12.2	35,478
California	502,722	275,750	22.3	600,819	322,833	19.8	165,660	88,200	2.2	739,436
Colorado				258,151	122,631	4.9	51,494	29,022	2.1	138,569
Connecticut	199,876	98,121	2.0	275,614	131,200	4.4				165,242
Delaware	69,537	34,768	7.8	98,995	41,350	7.7				268,125
Florida	12,030	6,015		509,329	254,665	3.2	398,579	173,817	17.0	194,942
Georgia	53,282	26,106	8.3	763,874	366,937	64.0	438,698	219,349	43.5	1,001,758
Idaho	98,027	60,463	17.0	190,312	114,011	10.7	40,748	24,382	3.0	104,989
Illinois	1,269,585	632,618	67.7	1,208,200	589,100	36.2	327,600	147,500	14.1	161,709
Indiana	410,671	200,658	29.1	128,482	64,241	5.6	225,336	112,600	12.2	855,868
Iowa	1,778,339	846,670	353.6	783,453	371,896	191.3	500,830	235,853	160.4	88,647
Kansas	234,574	117,287	29.6	773,916	389,866	50.7	427,439	213,719	28.1	1,109,944
Kentucky	539,652	162,935	40.9	606,853	200,095	35.0	475,019	125,751	21.3	254,327
Louisiana	41,637	20,818	3.7	256,292	128,091	22.0				458,796
Maine	213,162	101,890	12.1	126,296	61,048	6.4				5,551
Maryland	45,300	22,650	1.1	136,390	68,195	7.1	86,000	42,500	6.1	383,032
Massachusetts	123,647	61,177	2.8	508,159	252,095	10.7	37,950	18,975	.4	479,637
Michigan	867,931	425,758	61.9	854,040	427,020	76.4	536,960	268,480	41.3	339,469
Minnesota	234,436	113,490	31.1	1,021,515	510,041	154.9	425,943	212,972	55.2	761,519
Mississippi	172,962	86,481	10.6	846,952	417,976	41.9	209,800	93,365	9.3	436,082
Missouri	381,414	190,305	55.6	416,637	195,566	41.2	356,812	141,812	37.7	633,688
Montana	606,308	342,715	78.7	117,816	66,483	5.3				647,944
Nebraska	336,160	167,619	63.6	684,169	336,101	89.3	142,915	71,457	28.4	216,967
Nevada	176,020	147,191	37.1	136,697	118,675	11.4	80,414	60,944	6.8	6,976
New Hampshire	85,641	40,146	2.2	60,190	29,832	1.2				167,812
New Jersey	319,500	159,750	10.6	318,057	158,940	11.4				503,134
New Mexico	101,564	63,386	13.1	634,137	343,277	28.8				86,993
New York	1,067,601	533,801	43.9	2,202,315	1,057,353	55.6	118,500	42,000	7.0	76,719
North Carolina	597,005	298,369	58.6	501,453	251,693	39.0	59,190	29,595	5.8	298,943
North Dakota	42,880	24,583	.3	141,704	75,952	1.2	27,520	14,750	2.4	1,014,689
Ohio	510,397	255,133	18.6	2,712,130	1,354,805	87.8	403,280	201,640	17.0	676,153
Oklahoma	581,887	308,724	43.8	209,265	110,288	13.3	92,880	49,059	3.1	931,680
Oregon	330,679	179,276	53.4	247,084	103,394	16.4	162,564	75,990	13.5	181,443
Pennsylvania	877,923	431,436	33.8	1,446,009	722,096	36.1	128,000	64,000	1.9	211,587
Rhode Island	150,728	75,309	3.4	89,358	44,679	.2	88,661	44,265	.9	45,797
South Carolina	149,900	61,994	12.3	614,103	233,873	80.6	284,667	91,000	41.3	167,095
South Dakota				3,624	3,624		24,600	13,780	9.0	1,267,133
Tennessee	109,151	52,519	7.9	223,822	111,911	10.1	101,734	50,867	2.8	865,132
Texas	1,095,726	536,563	166.2	729,528	360,278	56.4	505,300	234,785	47.4	708,420
Utah	25,247	16,100	6.2	245,282	156,660	25.4				124,932
Vermont	255,700	86,334	9.5	250,608	85,721	10.0	42,494	21,247	1.2	1,253
Virginia	301,000	139,038	17.4	438,182	199,955	17.9	213,302	101,655	9.8	184,705
Washington	200,724	105,688	9.5	422,281	223,839	21.5	234,587	121,700	25.0	142,634
West Virginia	262,400	130,675	15.2	74,819	37,409	3.4	127,225	63,612	4.5	409,548
Wisconsin	236,054	117,114	3.3	698,927	349,360	26.6	79,661	35,800	1.7	615,766
Wyoming	433,925	258,391	42.8	73,067	43,669	4.0	73,555	47,016	5.1	70,147
District of Columbia	38,300	19,150	.6	92,384	45,692	.8				22,150
Hawaii	277,851	138,782	8.6	1,096	1,096					158,778
Puerto Rico				302,225	147,640	14.0	55,188	27,140	2.1	80,406
TOTALS	17,050,353	8,469,541	1,552.3	25,867,177	12,752,018	1,551.2	7,893,595	3,699,307	702.8	19,092,456

DETOUR COURTESY

MOTORISTS, DRIVING along Route 23 in New York State, have had their attention diverted from the magnificent Catskill Mountain scenery by nine miles of new highway construction between the villages of Harpersfield and Davenport Center, just east of Oneonta. Ordinarily, nine miles of more or less rough driving would be met with groans or profanity . . . but not these nine miles . . . because the contractor, Robert E. Tompkins, of Rochester, New York, has a new angle on how to win public favor.

As motorists approach the new construction, they are greeted by a series of three signs on the right hand side of the road. The first sign says, "For 9 miles ahead your money is building a new road"; the second sign reads, "While traveling thru we will do our best to minimize any delay"; and the third sign concludes with, "Be assured you will have our cooperation and courtesy. R. E. Tompkins, Contr., Rochester, N. Y."

Cynical drivers that think these signs are "a lot of baloney," are quickly disillusioned . . . for within the first half mile they find a 44-B Bucyrus-Erie shovel and a little fleet of Model K Euclid dump trucks which pause obligingly to let them pass. Two or three miles further on, the road is blocked again, but only momentarily, so some Ford, Chevrolet and Dodge trucks can supply batches of aggregate and cement to a 1-yard Foote or Rex paver. And the flagman, waving them on, apologizes, "Sorry to hold you up."

Just as the end of the job is reached, there are three more signs, this group being on the left hand side of the road, painted on the backs of the signs which greet motorists coming from the opposite direction. These "farewell" signs read, "Thank you for your cooperation" . . . "If it were not for you . . . we would not be working. R. E. Tompkins, Contr., Rochester, N. Y."

● **Motorists approaching and leaving the Robert E. Tompkins highway construction job pass these six signs which have turned out to be an excellent goodwill investment for Contractor Tompkins.**

Courtesy, as well as ingenuity, is practised by Robert E. Tompkins on this 9-mile highway improvement job on New York State's Route 23

By SPENCER JONES

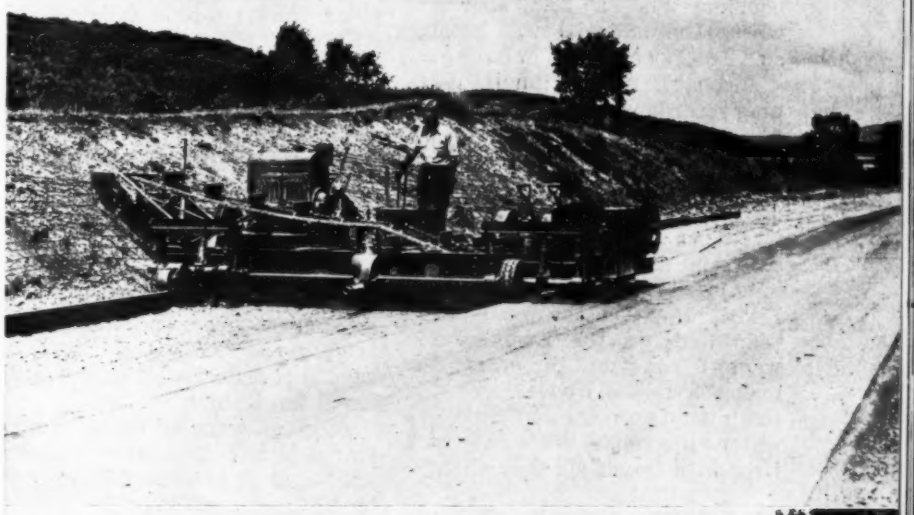
The reactions of local and long distance drivers to these signs, and the manner in which the promise is performed, are so extremely favorable that "Bob" Tompkins and his men are considered public benefactors instead of nuisances. For instance, the photographer whose pictures illustrate this article was talking to a businessman in nearby Oneonta. "Oh, you're on 'Bob' Tompkins' job, are you? Well, I wish there were more roadbuilders like that," said the Oneonta man, and adding, "There's a guy who makes people really enjoy nine miles of rough going."

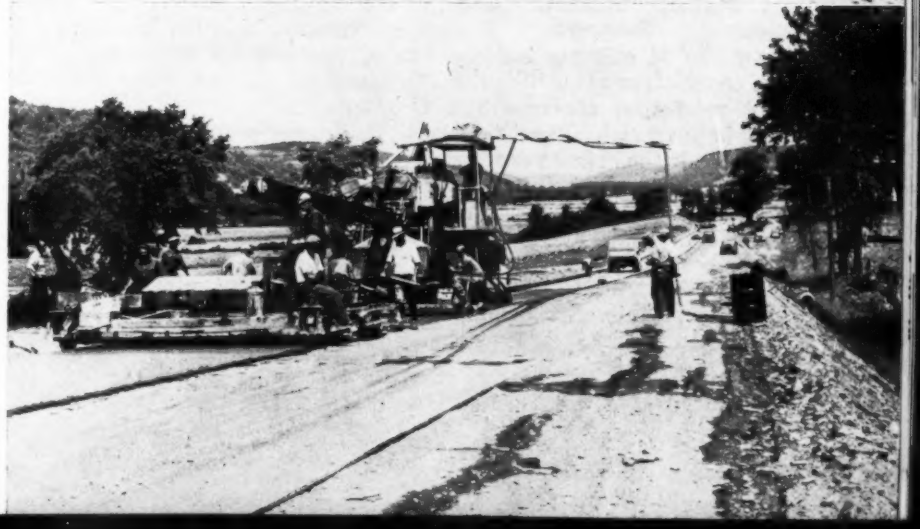
This particular Tompkins' job called for the improvement and partial re-location of an old road which had a bad line-up and some steep pitches. Tompkins was awarded the contract in the early fall of 1939 on his bid of $488,527.63, with the completion date set for December 1, 1940, but no bonus or penalty clauses. The legal owner is the State of New York, Department of Public Works, Division of Highways, and the legal name of the job is Harpersfield-Davenport Center Route 23, Delaware County, Reconstruction and Re-Location Project No. 552E-1, Contract No. RC-4066.

The area traversed by the job is rolling country and much of the digging and filling was sidehill work, but there were no deep cuts or fills, and no rock to blast out. In the entire 9.09 miles there were only 280,000 cubic yards of unclassified excavation.

Following is a list of the chief items in the contract, together with the prices bid on them:

280,000 cu. yds. Unclassified excavation at ----------10c per cu. yd.
118,300 sq. yds. Fine grading for concrete pavement at--10c per sq. yd.
38,000 bbls. Portland cement at ----------$2.25 per bbl.
33,300 lin. ft. California redwood guard rail, at ---------75c per lin. ft.
30,000 cu. yds. Gravel base for paving, at ----------60c per cu. yd.
24,423 cu. yds. Reinforced concrete





● **Top: A 2-yard dipperful of New York hardpan is dumped into a 9-yard Euclid wagon by the Bucyrus-Erie 44-B. Center: Surface of the 9-inch gravel base is prepared for paving operations by an R-B finegrader. Bottom: Placing the concrete pavement with a Foote paver. Note overhead support for water hose.**

● An aggregate storage bin at the Tompkins quarry is filled by a Bucyrus-Erie crane equipped as a clamshell.

pavement, at ---------$5.70 per cu. yd. 117,400 sq. yds. Bar mat reinforcement for pavement, at 23c per sq. yd.

All cuts were dug with a 44-B Bucyrus-Erie 2-yard shovel, powered by a Buda-Lanova diesel motor. The digging was comparatively easy except for occasional boulders and a few stretches where the material was mostly small rocks embedded in hard pan.

Although no outstanding digging records were established, the 44-B Bucyrus-Erie kept four Model K 9-yard Euclid dump wagons on the jump and could have used two or three more in a few places, as the average haul from cut to fill was from 700 feet to ½ mile. After noticing how the 18x24, 16-ply Firestone Ground Grip tires on the Euclid dump wagons compact the earth, it makes a fellow wonder why the tire manufacturers don't put out water-filled rollers made like truck tires with treads six feet wide.

Drainage Excavation and Structures

Of the 74 culverts included in the contract, one is a 10-foot x 10-foot reinforced concrete box 40 feet long from headwall to headwall, while the balance are 24-inch to 60-inch circular reinforced concrete pipe. Excavation for the box culvert was made by the 44-B Bucyrus-Erie shovel, and the balance of the culvert trenches, plus 8,000 feet of trenching for drain pipe, was dug with a ⅜-yard gasoline-powered 10 - B Bucyrus - Erie shovel. Where trenches were a trifle too wide for the caterpillar treads of the 10-B to straddle, it was operated from planks spanning the excavation. This saved the need of changing the 10-B over into a dragshovel and permitted truck loading where it was necessary.

Some 3,000 feet of the drain pipe was 6-inch Robinson "Skip-Pipe" and the remaining 5,000 feet was 6-inch round tile. The drain pipes lead into 22 concrete catch basins.

One bridge was included in the contract, a 30° skew plate girder structure of 90-foot span, across which ran the only sidewalks in the contract, except for some pieces of sidewalk restoration in the village of Davenport, a few miles east of Davenport Center.

Rough grading was compacted with a La Plant-Choate sheepsfoot roller, drawn by a Model 30 Caterpillar tractor which followed an AK - 8 LeTourneau bulldozer mounted on a D-8 Caterpillar tractor. At the end of each day's work the fill was rolled with a 10-ton Buffalo-Springfield roller to seal the surface.

A nine-inch gravel base for paving was dumped over the rough grade by four Euclid Trac-Truks. Fine grading was accomplished by an RB Finegrader followed by a five-ton gas-powered Austin-Western pup roller. A No. 12 Caterpillar diesel Auto Patrol grader preceded the form crew.

Aggregate for all concrete was stored in a 3-compartment stone and sand aggregate bin of 100 tons capacity, made by Butler Bin Company. This bin was kept full of two sizes of stone as well as sand by the 1030 Bucyrus-Erie clamshell.

Portland cement was purchased in bulk and automatically unloaded from the cars into a 283-barrel bin. The 2-yard trucks received accurately-measured loads of the proper sizes of stone and the sand at the aggregate storage bin. Then they drove under the cement bin, also made by Butler Bin Company, where the exact amount of cement was weighed out and loaded onto each load of aggregate. Tarpaulins over the truck bodies kept the cement from blowing away during the long hauls.

Batching for pavement work was accomplished by a fleet of Ford, Chevrolet and Dodge trucks equipped with 2-yard Gar Wood bodies. These trucks loaded in a storage yard under a 1030 Bucyrus-Erie ¾-yard clamshell. As this storage yard was located at Davenport Center, at the extreme western end of the new construction, there was a 9-mile haul and a 9-mile return trip for these little trucks when they were dumping at the extreme eastern end, with an average run of 4½ miles each way, considering the job as a whole.

Paving was done with a 27-E Foote paver. Here, too, contractor Tompkins showed consideration for the traveling public (and incidentally saved a little wear and tear) by elevating the water hose to the paver so that motorists drove under it instead of bumping over hose-guard planks.

The pavement was 8 inches thick at the outer edges and 7 inches thick along the center line. Acme spade type joint supports were used. Net actual speed of paving was about three miles per month.

About 3,000 square yards of concrete gutter were laid through Davenport Center. This concrete was mixed with the Foote 27-E as well and that for the catch basins, was mixed by a 10-S Jaeger mixer, while the concrete for the box culvert was mixed by a 1-yard Rex.

For general utility towing, Robert Tompkins used a Fordson tractor, which he found better suited for such purposes than a truck. Light hauling was done with a Ford V-8 utility truck.

Complete Servicing Equipment

The various pieces of mechanical equipment on this job, the shovels, clamshell, trucks, pavers, etc., were serviced like nobody's business! One man spent eight hours a day driving a Ford V-8 service truck from one end of the job to the other. The completely equipped truck carried: 500

● Robert E. Tompkins (left) and Master Mechanic Ralph Barrows with the ingenious and efficient portable welding outfit that was constructed on the job.

pounds grease, 300 gallons gasoline, 200 gallons diesel oil, 30 gallons lubricating oil in six different grades, and one gallon distilled water for batteries.

In addition, this service truck was equipped with an air compressor, tire pump, grease gun, set tire tools, complete set emergency auto repair tools, tire gauge, first aid kit, flood light, two buckets, and three lines of hose.

All mobile equipment was serviced by this truck, wherever and whenever attention was needed.

Maintenance work was under the supervision of Ralph Barrows, master mechanic, who not only had a completely equipped portable Ford-powered machine shop and a blacksmith shop with oxy-acetylene welding equipment, but also was the proud constructor of an ingenious and efficient portable electric welding outfit.

This electric welding assembly consists of a Model No. WR-300-S Hobart welding generator which produces 300 amperes at 40 volts, or 12 kilowatts. The current range is from 50 to 400 amps, making possible hundreds of combinations of voltage and welding current with no dead spots. The welding generator was mounted on the chassis of a Ford V-8 and direct-connected to the V-8 motor which had been taken from its original position in the front of the chassis and re-mounted just forward of the rear axle.

A heavy duty 50-60 volt electric motor, operated by current from the welding generator and drawing less than 100 amperes, was clutch-connected to the front end of the Ford V-8's gear box. The electric storage battery and the starting motor-generator of the V-8 were retained to start the gasoline motor.

The apparatus is driven and controlled by throttle control of the speed of the gasoline motors which turns the generator that supplies the current, through a switch, to operate the 50-60 volt electric motor. The electric motor turns the drive shaft which transmits the power to the rear wheels. Cruising speed is 50 miles per hour and Master Mechanic Barrows claims the rig will climb anything on which the rear wheels can get traction, and do it in high gear!

Occupying the space formerly used by the V-8 gasoline motor (minus the small area needed for the electric motor) is a platform of diamond pattern steel plate which is used as a work bench for welding, as well as for carrying tools and gas welding tanks. For night work, the apparatus is also equipped with a 1,500 candlepower floodlight.

It may appear a little out of the ordinary for a highway contractor to have such complete provision for service and repair of mechanical equipment on a job involving only a couple of shovels, a clamshell and a few trucks and tractors. But the fact is that Tompkins has more mechanical equipment than this to service and keep in repair.

Tompkins Opens Up Own Quarry

About a mile to the southwest of Davenport Center, up near the top of a hill, Tompkins bought 33 acres of pasture land recently and opened up a commercial quarry. The rock is a blue sandstone and is the only rock quarried for many miles in any direction which meets with the approval of the New York State Department of Public Works as concrete aggregate material.

To a certain degree, Contractor Tompkins was forced to become a quarryman. Prior to the highway job described in this article, he built a 400-foot reinforced concrete overpass across the New York Central railroad tracks at Davenport Center at a contract price of $78,000. The high transportation cost of the stone he had to ship in for this work made him determined to find some nearby approved source of supply, even if he had to do his own quarrying.

So he prowled around the countryside and finally discovered what appeared to be a satisfactory grade of rock on the 33-acre tract

(*Continued on page 30*)

● General view of the completely equipped crusher plant. Road at the right leads to the quarry floor.

The ability of the dragline-dredge rigs to handle large volumes of low ore-bearing material under difficult conditions at minimum cost explains their popularity with large as well as small operators. Here is the story of John Henry of California

By CHARLES F. BERRY

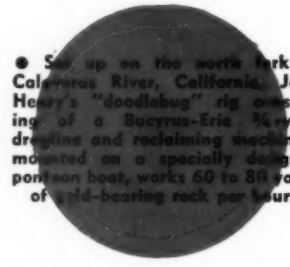
LIKE SO MANY jungle beasts frolicking at their waterholes, "doodlebug" dragline dredges of every species splash in California streams.

Today there's hardly a riverbed in the whole Mother Lode country that isn't being worked by the dragline machine, which is revolutionizing the placer mining industry throughout the world. Some 150 dredges, ranging from tiny 200-yard-per-day boats to huge plants handling up to 10,000 yards, are recovering $7,000,000 worth of gold a year in California.

Continued progress of the dragline dredge is based on its ability to handle large volumes of low ore-bearing material under difficult conditions at minimum cost. The big secret of profitable operation is, of course, the range of dragline capacity and the employment of the right size of design of rig for the particular job.

Placer operations in California were revived in the face of unfavorable circumstances, for since the days of '49 the streams have been worked by Chinese and white men until the placer gravel can no longer be handled profitably by ordinary equipment. In addition, legislature restricting hydraulic mining and stream polution further limited activity.

It was the invention of the "doodlebug," credited to Horace Onyett of Oroville, that brought life back to the industry. While his original type of boat, with its 25 yards per hour capacity, sufficed for the working of certain river claims, it did not solve the whole problem, for some low-grade material could be handled profitably only by plants of large capacity. Other pieces of gold-bearing property were practically inaccessible and required small easily transportable units. On still other claims there were difficulties of water depth, boulders or small available yardage.



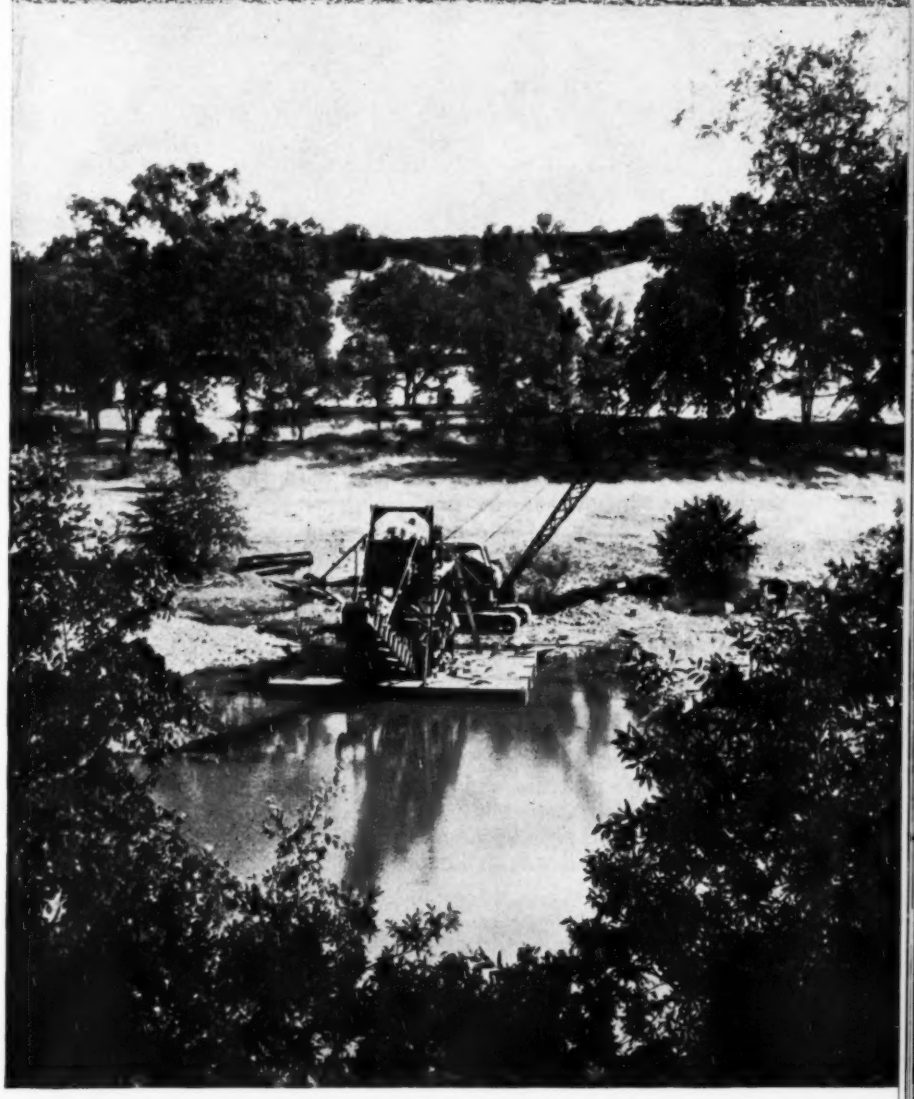
● Set up on the north fork of Calaveras River, California, John Henry's "doodlebug" rig consisting of a Bucyrus-Erie ¾-yard dragline and reclaiming machinery mounted on a specially designed pontoon boat, works 60 to 80 yards of gold-bearing rock per hour.

Diversified Development of "Doodlebug"

The development of the dragline dredge has been one of diversified design to meet every condition. Through the proper combination of screening plant, dragline and bucket capacity, initial investment cost and mobility of plant, the lowest possible per yard handling cost is being approached by the majority of successful operators. Year after year new improvements to simplify operations or transportation, or to accomplish new duties, such as the resoiling device which discharges tailings practically to the original level of the dredged land, are increasing efficiency of equipment.

Most of the claims lie well off the roads often over difficult terrain, and it is a matter of weeks of work to transport and set up large outfits. In such cases, unless the total yardage to be worked is sufficient to keep the plant in operation for many months, small

"Doodlebugs" REVIVE PLACER MINING



rigs are apt to prove the most economical.

One of the more useful types of outfits for all-around independent use is a small sized boat with a Bucyrus-Erie 22-B dragline. Such an outfit is being used with unusual efficiency by John Henry, a young Sacramento operator, who works the Calaveras River section.

Using a ¾-yard Esco bucket, Mr. Henry handles 60 to 70 yards of placer gravel per hour, even in difficult or shallow ground. In easy territory he can work 80 yards of gold-bearing rock per hour.

According to John Henry, this combination of dragline and specially designed pontoon boat and gold recovery machine is far more efficient than any other ¾-yard outfit in the region. Naturally small but efficient rigs such as the Henry 22-B (the average sized outfit in the region is 1½-2 yards) cannot quite meet the low per yard handling cost of some of the bigger rigs in the large, easily accessible fields. Yet, through economic dragline operation, with a small crew and low fuel cost, he is able to work economically many small but difficult pieces that less mobile rigs cannot afford to go into.

Several factors influenced John Henry when he purchased his dragline. Per capacity his capital investment on a small rig was greater than on a larger rig, since the ¾-yard dragline cost somewhat more than half that of a 1½-yarder. Also, Henry figured the per yard operating cost on the smaller model as slightly greater. Yet, in view of the preponderance of 1½-yard models in his particular territory and the fact the ground suited to this size dragline grows scarce, Mr. Henry reasoned that the best chances for good pay ground would be in small pieces, which could be worked only by outfits with a low moving cost. (Ordinarily, John Henry demands 200,000 yards of workable material to insure a minimum of ten weeks supply of good pay gravel.)

The boat used in these operations was designed by Mr. Henry himself, coordinated in size and capacity with the 22-B dragline. The hull, measuring 24 feet x 24 feet consists of three 8 feet x 24 feet pontoons bolted together. Attached to the deck of the hull is a steel framework supporting the runs-screen, pump, two diesel engines and the stacker which extends out into the water.

The boat takes a 20-inch draft, but loaded requires a minimum of 26 inches of water to maneuver easily. The 35-foot stack can operate in depths from 2½ to 20 feet of water, with 8 feet offering maximum efficiency.

First job for the dragline, after hoisting sections for boat assembly, is usually damming the stream to obtain the desired water level. In California's Mother Lode country the majority of the rock-bedded streams are mere trickles in sum-

(*Continued on page 28*)

DRAGSH

YOU HAVE TO ADMIT that Ripley is pretty good. His coverage of oddities in the news is thorough. But when Ripley featured the City of Azusa, California, in his syndicated column about a year ago, he missed something big.

Tradition has it, according to the famous "believe - it - or - not" man, that Azusa was so named because it had everything from "A" to "Z" in the U.S.A. It has that, and more. It has a city engineer named Paul Kressly. Engineer Kressly is what Ripley missed.

Mr. Kressly, who retired from active consulting engineer practice back in 1931, still dabbles around with engineering. He designs sewerage systems and just about everything else you want designed. Then he goes ahead and gets them built. And how he builds them!

● Backing down the ditch line, this Bucyrus-Erie ⅜-yard dragshovel excavates a six-foot sewer trench for the City of Azusa at a small fraction of the former hand labor cost.

On his latest work, Mr. Kressly has done something which hits you with the force of a hickory club when you consider the facts. He has replaced prohibitive hand labor with modern machinery on the Azusa sewerage disposal plant which the City of Azusa is sponsoring for the WPA. When Engineer Kressly got together with the city aldermen and ordered a new Bucyrus-Erie 10-B dragshovel powered with a gasoline motor, he literally gave the former slow and costly hand methods a kick in the pants.

Azusa lies at the base of the San Gabriel Mountains, about 30 miles east of the City of Los Angeles. The topography of the surrounding country is gently sloping, with no major streams or other means for sewerage disposal. Obviously, the best means to dispose of city sewerage is through a plant constructed for that purpose. In 1933, however, when City Engineer Kressly designed the plant, the cost to the taxpayers of the little community would have been an undue hardship if they had been saddled at that time with the $140,000 necessary to construct the plant and the system of sewer lines.

The city got by with inadequate facilities until a year ago, when an arrangement was made with the WPA for construction to start. Under the agreement with the WPA the City of Azusa was to bear 25% of the cost and furnish the materials necessary for the job.

Five Miles of Ditches to be Dug

Included in the $140,000 job are three miles of sewers six feet deep, carrying 21-inch vitrified concrete pipe, and two miles of lateral sewers carrying 8-inch vitrified concrete pipe. The main disposal plant consists of a pumphouse which houses the Parshall flume meter, sewage pumps, heater, influent and effluent meters, and the chlorinator. Arranged neatly over the premises are a 148-foot diameter rotary sprinkler filter, preliminary and final settling tanks, a sludge digestion tank, sludge gas controller, sludge drying beds and the percolation beds. Later, when the present work is done, the city contemplates a new project of 17 miles of excavation for an 8-inch sewer line. This line will lead into the mains of the present ditch system leading to the disposal plant.

The job was tough going, at first. The country through which the sewer line was being dug was mostly an old tertiary stream bed,

● Constructing Azusa's rotary sprinkler filter plant. Its circular wall is made up of native stone.

SHOVEL Vs. HANDSHOVEL

Here's an interesting comparison between hand and machine excavation costs experienced by the City of Azusa in the construction of a sewage disposal system

By FLOYD SUTER BIXBY

full of boulders. While no cementation of the formation was apparent, digging trenches by hand labor soon resolved itself into an expensive setup which stood a good chance of costing the city too much money unless something better was done. The first costs on hand excavation ran something like $4.00 per cubic yard. By skillfully suggesting changes in personnel and arranging the crews to better advantage, Kressly managed to cut excavation costs to $1.63 per cubic yard.

This was no reflection on the ditch diggers. They were doing all that was humanly possible. It was only that each boulder had to be dug loose with a pick before it could be thrown out of the trench, that the men were not able to show more yardage. Knowing that sewer ditch excavation should not cost the city the price it was costing, Engineer Kressly did some quick figuring. And he came upon the idea which Ripley missed.

The agreement with the WPA provided that this agency furnish all the machinery to be used on the project. But it said nothing about prohibiting Azusa from furnishing machinery, providing that the city wanted to furnish it. With the 17-mile job looming in the offing, Kressly recommended to the city fathers that a machine be purchased to do the work. In due time a Bucyrus-Erie 10-B dragshovel, fitted with a 3/8-yard bucket, was put on the job to excavate the sewerage trenches.

Engineer Kressly was killing several birds with one stone with this purchase. Part of the $1.63 figure represented the cost of shoring and bracing the 6-foot figure ditch when it was dug by hand. Kressly figured that the material would stand up well enough by digging it slightly off the vertical with the 10-B to permit the pipe laying crew to work in comparative safety without shoring. He also figured that the machine would increase the efficiency of the pipe crews as well, simply by keeping out ahead of them more than was possible under the hand labor system.

Comparison of Hand and Machine Costs

At the time the job was visited, the 10-B was comparatively new on the project, having been in operation only a few days. But it was entirely possible to set up a sliding cost estimate, and here it is, quite in sharp contrast to the hand excavation costs:

COST OF HAND EXCAVATION (BEST FIGURE) ----$1.63 per yard

COST OF MACHINE EXCAVATION, DETAILED:

General Work Information.

Excavation of sewer line with Bucyrus-Erie trench excavator. Working one shift only, 8 hours during daylight.

Typical Shift Expense:

1 shift foreman (proportional expense) 2 hours @ $1.00 per hour	$ 2.00
1 dragshovel operator 8 hours @ $1.00 per hour	8.00
16 gals. gasoline @ 12c	1.92
2 qts. motor oil @ 25c	.50
3 lbs. grease @ 25c	.75
8 hrs. machine upkeep @ 50c	4.00
8 hrs. item incidentals @ 50c	4.00
Total field operating expense per 8 hrs.	$21.17
Total field operating expense for 1 hr.	$2.646

Unit Cost:

If machine digs	It costs
50 yds. per shift	42.3 cts. per yd.
100 yds. per shift	21.2 cts. per yd.
150 yds. per shift	14.1 cts. per yd.
200 yds. per shift	10.6 cts. per yd.
250 yds. per shift	8.5 cts. per yd.
300 yds. per shift	7.1 cts. per yd.
350 yds. per shift	6.1 cts. per yd.
400 yds. per shift	5.3 cts. per yd.
450 yds. per shift	4.7 cts. per yd.
500 yds. per shift	4.2 cts. per yd.
550 yds. per shift	3.8 cts. per yd.
600 yds. per shift	3.5 cts. per yd.
650 yds. per shift	3.3 cts. per yd.
700 yds. per shift	3.0 cts. per yd.

(Continued on page 31)

● Another view of the 3/8-yard dragshovel cutting through the heavy rock of an old tertiary stream bed.

Equipment

you ought to KNOW ABOUT

Bucyrus-Erie ½ yd. 15-B machine

Manufacturer: Bucyrus - Erie Co., South Milwaukee, Wisconsin.

Claims: Hoist, crowd, and swing synchronized for fast cycle. All-welded revolving frame with the side frames and gear case welded integral with the main frame for added protection against misalignment. Main machinery is compact and simple, permitting a virtual straight-line flow of power from the engine to the point of application. Low friction loss, smooth operation and accurate alignment assured by the use of 35 anti-friction bearings. All gears, except the swing-rack and pinion, are completely enclosed and run in oil. Fast, smooth swing resulting through the reduction of dead-weight in machinery and frame and by using conical hook swing rollers in a double roller path, cast integral with the truck frame.

Large, cool-running clutches with interchangeable parts, self adjusting for temperature variations and with an easily-set single point wear adjustment. Digging lock, controlled by a single lever from the operator's position permits (1) free motion in either direction (2) locking against motion in both directions (3) locking against forward motion in one direction but permitting motion in the other. Mounting and propel machinery stress rugged strength and simplicity. Sixteen - inch treads provide a bearing area of 21.5 sq. ft. Twenty and 24-inch mountings available. Crowd rope and drum are mounted on the shovel boom and no clutch or brake changes are required for conversion from dragline or crane to shovel. All welded booms give maximum range and capacity per pound of weight. Independent boom hoist machinery—full power control of raising and lowering, with automatic safety ratchet.

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

Gardner-Denver portable compressor

Manufacturer: Gardner-Denver Company, Quincy, Ill.

Claims: Designated model ABY-85. Has two stage compression which saves gasoline and insures operation well below carbonizing temperatures. Completely water-jacketed cylinders maintain an even temperature for proper lubrication summer or winter. Cold starting damage to cylinder blocks, pistons, and rings is avoided as compressor cylinders are warmed up during the warm-up run of the engine. Discharge temperatures are low. An oversize Twin Disc clutch permits easy

cranking and warm-up of engine before it takes the compressor load. Fifty-five per cent reserve power. Roller bearing two-wheel spring trailer for towing to and from the job. Stabilizing legs to keep machine's position intact.

Ideal rechargeable flashlight battery

Manufacturer: Ideal Commutator Dresser Company, 1613 Park Avenue, Sycamore, Illinois.

Claims: Similar in principle to the well known automobile storage battery. Small in size to fit all popular two cell, 1¼" size D flashlight cases. Proven through actual heavy duty service. Especially useful and money-saving to large users of flashlights for it can be charged from time to time.

Arranged chamber and vent plus semi-fixation of the electrolyte makes it spill proof. Plates are over ¼" thick and connect to terminals by reinforced electrodes. Transparent Lucite case. All batteries are "use conditioned" at the factory.

Small charger, consisting of transformer and rectifier plates, is used to keep the battery always

fully charged. Merely plug into convenient 110 volt, 60 cycle wall socket. Recommended charging time is 12 hours, costing only about 1/10 of one cent per charge based on a five cent kilowatt hour rate. Clip also available for charging from a 6 volt automobile battery. "Gang chargers" available for large users.

Write to the company for further details.

Nugent fuel-oil filter

Manufacturer: Wm. W. Nugent & Co., Inc., Mfrs., 427 N. Hermitage Ave., Chicago, Ill.

Claims: Patented construction gives up to 20 times more filtering area than most filters of comparable size. Results in low oil flow velocity through filter, longer intervals between cleaning, less maintenance and labor expense. Special woven, acid resisting, lintless textile filter element removes particles as small as .0003" to produce 99-8/10% clean oil.

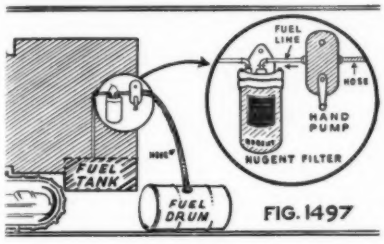


FIG. 1497

International K-line trucks

Manufacturer: International Harvester Company, 180 N. Michigan Avenue, Chicago, Illinois.

Claims: Five new models ranging in rated capacities from ½ to 1½ tons—the ½-ton model K-1,

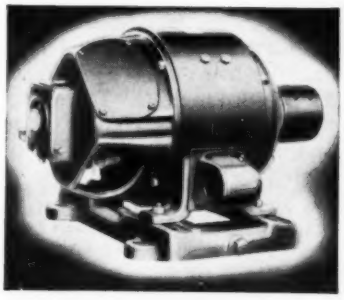
¾-ton model K-2, 1-ton model K-3, 1¼-ton model K-4, 1½ ton model K-5. Wheelbases range from 113 to 177 inches and gross vehicle weight ratings from 4,400 to 13,500 pounds. Powered by the new "Green Diamond" engine. All models are equipped with hydraulic brakes. On the models K-4 and K-5 a new type of rear wheel brake ("Hi-Tork") is employed. Many new, easy-riding qualities and design features are incorporated in the "K" models.

For further details about the equipment on this page please write to the manufacturer, mentioning Excavating Engineer.

General Electric D-C motors

Manufacturer: General Electric Company, Schenectady, New York.

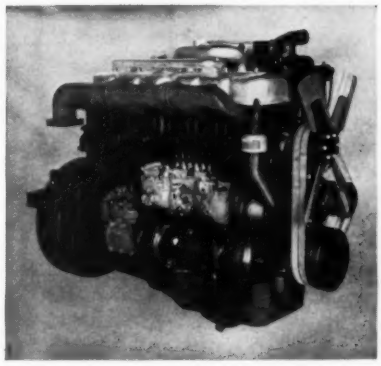
Claims: New design of rolled-steel frame and improvements in end-shield and bearing-bracket construction combine to give the new motors excellent protection from external damage. Formex wire coils and Glyptal insulating varnish provide high resistance to impact, abrasion, and the action of foreign materials. Motors can be furnished with sleeve or ball bearings. Open motors are available in constant-speed ratings from ½ hp to 850 rpm up to and including 60 hp at 1750 rpm; in adjustable-speed ratings from ½ hp at 850/3400 rpm up to and including 15 hp at 500/1800 rpm. New V-type double-brushholders give better commutation and permit rotation in either direction. New type lifting lug facilitates handling.



Mack-Lanova diesel engine

Manufacturer: Mack Trucks, Inc., Long Island City, N. Y.

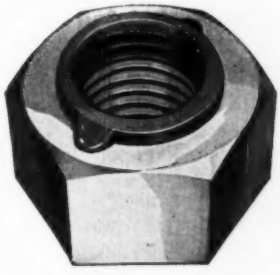
Claims: Similar in design and principle to the 519 cu. in. model ED engine, this new END605 diesel has a piston displacement of 605 cu. in. and bore stroke of 4⅝" x 6". Operates at same maximum speed as the Model ED (2,000 r.p.m.), develops 144 h.p. at that speed. Maximum torque at 1,100 r.p.m. is 455 lb. ft. This new engine will develop more horsepower and greater pulling power than any other engine of the same or greater displacement. Combines smokeless combustion with high power, high speed, and smooth running. Freedom from smoke and smell an important characteristic.



Security nut

Manufacturer: Security Metal Products, Inc., 367 East Kalamazoo Avenue, Kalamazoo, Michigan.

Claims: Can be tightened up or backed off part way, years after its application, and still retain its grip on the bolt. Can be taken off and reapplied many times without losing its gripping power. Bolt gripping element consists of a slightly elliptical shaped spring-steel retainer permanently seated in the head of a standard nut. When the nut is applied, the retainer is distorted from an elliptical into a circular shape, thus setting up a powerful spring pressure between the bolt threads and the retainer threads. Bolt or retainer threads are not injured when applying or removing.



● Dismantling operations for a move to a new claim is only a day and a half job with the help of the all important dragline.

"Doodlebugs"

(Continued from page 23)

mer time and must be worked in 100 to 500 foot long ponds which usually require three or four hours dragline work for damming.

Digging and Handling the Pay Dirt

Swinging a heavy duty placer-type ¾-yard Esco bucket, the 40-foot dragline feeds the placer gravel to the stack at the rate of 1½-yards per minute. A 20-inch rubber belt on nine double sets of Rex Sterling rollers carries the gravel to the trommel screen. Both stacker and screen are operated by the same 1-cylinder GMC diesel. Another motor of the same model operates the Fairbanks Morse pump, which washes the gravel. In addition, there is a small Jaeger 1½ hp pump used for clean-up and testing.

In good gravel without clay this outfit easily handles 700 yards per eight-hour shift. With all ball and roller bearings in stack and screen and all ball bearing pumps, the fuel cost is low, the two engines of the boat consuming a combined maximum of two gallons of 6-cent diesel fuel per hour.

The 60 hp GMC power plant of the Bucyrus-Erie 22-B dragline is built to run at 1,400 revolutions normal and 1,200 for continuous operation. Mr. Henry, however, prefers to keep his motor down and has never yet run it over 1,200. His fuel consumption, using a 2,700-pound ¾-yard bucket, he declares, believe it or not, has never exceeded 2½ gallons an hour. Since he first started operations with his present outfit, the dragline, including time out for moving and dismantling, has been in operation 80 per cent of all working time.

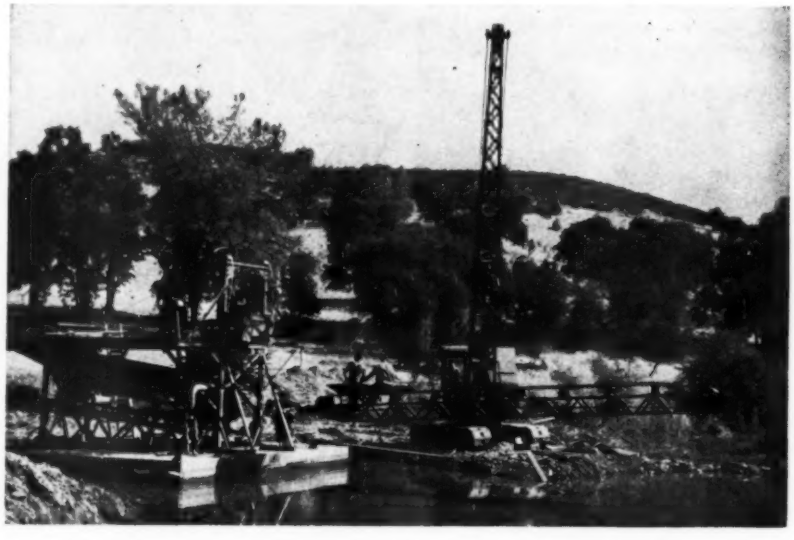
Recently, John Henry and his crew of three helpers have finished working a 2,000-foot stretch of the Calveras riverbed just below the dam near Valley Springs. In approximately 100 days on the job, the outfit profitably handled 70,000 yards of placer gravel and rock. Cost of handling the material on various sections varied from a minimum of 10 cents per yard to a maximum of 15 cents.

Upon completion of the claim, the Henry outfit pulled stakes and moved to a new location on the North Fork fifty miles away. Dismantling required a day and a half, and two days were needed for re-erection. Single pontoons, the main frame, the stack and the trommel screen each weigh just under 5,500 pounds. These sections, together with the engines and pumps, were picked up by the crane and placed on trucks in short order after connections were unbolted. Total cost of moving both boat and dragline, including loss of time, was estimated at less than $250.00, as compared with $1,500 upwards for larger outfits.

In addition to the boat and dragline, the outfit includes trucks, a RD-4 Caterpillar bulldozer for road building, a Lincoln 200-amp welder, sleds and tanks.

Plus the occasional catskinner, John Henry's crew consists of E. T. Lakin, boatman; Lester Comnell, oiler; and Leonard Ackert, dragline operator.

● The rig's 5,500 pound stacker is swung clear, preparatory to loading for shipment to the next John Henry placer claim.



The Ballad of Fresno Pete

By Bob Belt

I cut my teeth on a whipstock sheath,
The stables were my schools,
And I learned to swear behind a pair
Of stubborn Goddam mules.

In my first long pants I took a chance
And joined a grading mob.
At twenty-two I had a crew
Hell-bent for any job.

My gang was the best in all the west
From Santa Fe to Nome,
And I've still the scar where a Johnson bar
Cracked down upon my dome.

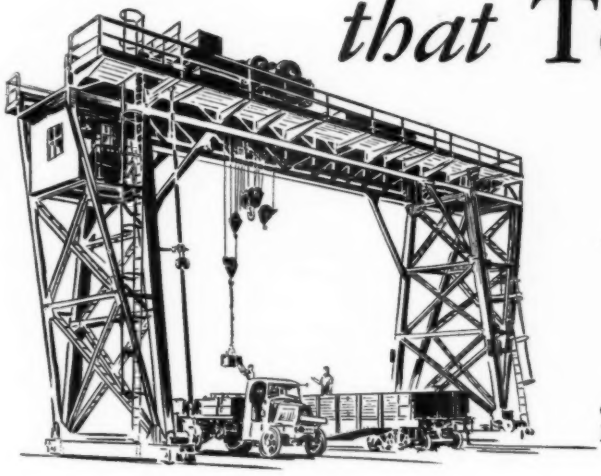
When the goin' got tough and the country rough,
They'd call on Fresno Pete,
And the toughest hills went into fills
When I put on the heat.

But things somehow are different now,
Machines move all the muck.
It's plain to see the guys like me
Are strictly out of luck.

But I'll stick around and hold my ground,
For I read in last week's papers
Of waning yields in the oil fields,
And I'm shining up my scrapers.

When the oil supply has run clear dry,
I'll make them feel like fools,
When Fresno Pete comes down the street
Behind his Goddam mules.

Giant Weight Lifter that Toes the Mark



The Story of the Newest Drive for Gantry Cranes

by W. C. RAUBE, *Industrial Department, General Electric Company*

MANY contractors have found to their sorrow that the two legs of a rigid gantry crane usually slip several inches out of alignment in a very short time. But here is a crane that really toes the mark. After three months of the roughest operation, its two legs were less than one-eighth of an inch out of line.

This gantry crane has a span of 74 feet. It provides for a lift of 60 feet above the gantry-drive rail heads, and weighs approximately 710 tons with a 350-ton load. Compound-wound, direct-current motors drive the crane, one on each gantry leg, and both are controlled from one point.

Practically Perfect Alignment

No synchronizing force is necessary to keep the two drives together. Advantage is taken of the fact that the gantry legs and bridge structure are well braced with stiffening trusses, which makes the bridge capable of transmitting considerable torque across the structure without skewing the gantry legs. The two high-torque, compound-wound motors—applied by General Electric engineers—minimize the variation of the speed of the two legs. In fact, they are in practically perfect alignment at all times.

The life of the crane is increased by the elimination of wear and tear caused by skewed legs. And this new system saved $10,000 on the cost of the crane by making unnecessary the conventional vertical and horizontal cross shafting, bevel gears, and bearings. Without these, maintenance is greatly reduced—there are no expensive outages caused by broken shafting, worn gears, and bearing linings.

W. C. RAUBE

Similar Results With A-C

If alternating current had been used on this job, the same results could have been obtained with wound-rotor induction motors instead of the compound-wound, direct-current motors.

For Nonrigid Spans

For gantry cranes with spans of several hundred feet or more, where rigidity is not feasible, another means would have to be provided for driving the two ends of the structure at the same speed because such a span is too long to cross-transmit any propelling force from one gantry leg to the other. The use of cross shafting on such a structure is even less satisfactory than on one with a shorter span because of the greater deflection and longer shafting required.

Therefore, the two legs of a nonrigid gantry crane are propelled in synchronism (from an alternating-current source) by the use of two wound-rotor induction motors operating in parallel. To synchronize the speeds of the two motors, their secondaries are joined electrically by a system known as a power Selsyn tie and controlled from a single secondary starting resistor with a section which remains permanently in circuit. As a result, the legs are always aligned within extremely close limits.

The solution of this problem of keeping the two legs of both rigid and nonrigid gantry cranes together is another of the triumphs of General Electric engineers. If you, too, have any electrical problems, why don't you submit them to us? We'll be glad to help find their solution. General Electric Company, Schenectady, N. Y.

GENERAL ELECTRIC

655-5

For your convenience in writing to General Electric Company, you will find a card bound in this issue.

Detour Courtesy

(Continued from page 21)

just mentioned. Official tests resulted in state approval and so the land was bought.

The contemplated construction of the nine miles of highway, previously described, was the chief factor in "Bob" Tompkins' decision to open his own quarry, as he figured that the lower cost of his stone would enable him to be the successful bidder. In addition, there is considerable new construction planned and in progress within easy trucking distance, so it looked like a good gamble.

The new quarry was equipped with a 2-cycle, 2-cylinder Cooper-Bessemer horizontal diesel engine and a 440 volt, 60 cycle, 3 phase General Electric generator to handle the 75 kilowatt load of the crushing plant. When the quarry was visited, the power plant was not yet housed in, but suitable protection was expected to be completed in a short time.

Actual quarrying operations start with a 1½-yard 37-B Bucyrus-Erie shovel, powered with a Caterpillar diesel motor. First, the 37-B crawls up the sidehill and digs off the overburden, loading it into a 9-yard Linn gas-powered tractor dump truck for hauling to nearby spoil piles.

Quarry Drilling Operations

Then, an Ingersoll-Rand FM-2, pneumatic-tired wagon drill starts making 2⅝-inch blast holes an average of 18 feet deep, the bottom diameter of the holes being 2 inches. Ingersoll-Rand detachable bits are used and cut 50 feet of hole before they need resharpening. At present the bits are usually sent away to be resharpened, but the purchase of a bit sharpener is contemplated in the near future. After five or six sharpenings, the wagon drill bits are discarded.

Average drilling speed of the wagon drill is one foot per minute, which would make plenty of dust if it weren't for the fact that a No. 2-A Kadco dust control system is used. Compressed air at 90 pounds pressure per square inch for the wagon drill and for two pneumatic hand hammers, an Ingersoll-Rand and a Cleveland, is furnished by a 2-stage, air cooled Ingersoll-Rand 315 cfm compressor, powered with a Waukesha gasoline engine.

These two air hammers, used for occasional secondary drilling, make ⅞-inch holes with Timken detachable bits that are discarded after they have made from 50 to 60 feet of hole.

Blast holes made by the wagon drill are spaced, staggered, on 3½-foot centers and 3½ feet back from the quarry face.

Blast hole loading procedure is as follows: five sticks of 2-inch diameter 60% gelatine, with a No. 6 Austin waterproof blasting cap near the bottom, are first lowered into the blast hole. Then two feet of rock dust stemming is poured in and tamped. On top of this stemming five sticks of 1¾-inch diameter 40% gelatine are placed, followed by another two feet of tamped stemming. Over this three sticks of 1¾-inch diameter 40% gelatine are placed, covered by stemming to the top of the blast hole. Explosives are stored in a magazine in the woods nearby.

One hundred holes are fired at a time, being hooked up in two units of 50 holes each, wired in parallel, and the two units wired and fired in series. That is, each hole in a unit is wired in parallel and the two units are fired in series. A 100-hole du Pont blasting battery is used. About ½ pound of explosive is used per cubic yard of rock brought down.

After the blasting, the 37-B Bucyrus-Erie shovel loads out the broken rock into the 9-yard Linn tractor dump truck, at the rate of 35 to 40 tons per hour.

Tompkins' quarry rock weighs about 4,500 pounds per cubic yard in the solid and about 2,400 pounds per cubic yard loose. Blasting usually breaks it down to sizes easily handled by the 37-B shovel. Chunks too large to go through the dipper are seldom drilled with an air hammer. Instead, they are broken with a 2,400-pound pear-shaped skullcracker which is suspended from one of the dipper teeth by a wire rope sling. The dipper is raised high and then allowed to drop so that the skullcracker hits the block of rock a hard blow, sufficient to crack it. The dipper, however, is not allowed to drop far enough so that the wire rope sling of the skullcracker is dislodged. Hence, there is no need to have a man continually replacing the sling around a dipper tooth. The technique of dropping the dipper so that the skullcracker can exert the maximum blow without dislodging the sling from the dipper tooth is something worth watching.

● Blasted quarry rock is loaded to a Linn tractor dump truck by the Tompkins Bucyrus-Erie 37-B.

Crushing, Cleaning, Sorting Aggregate

Blasted rock, loaded out by the 37-B shovel into the Linn tractor

truck, is hauled about 150 yards to a crushing plant which is 100% Kennedy-Van Saun equipped. The primary crusher is a 14-inch gyratory, from which a 24-inch conveyor belt delivers the crushed rock to a triple-deck 3-foot x 10-foot wire mesh vibrating screen. Rocks too large to pass through the 1⅞-inch mesh of the upper deck are chuted to a surge bin and, thence, on an 18-inch conveyor belt to a No. 25 gyratory secondary crusher. After passing through the secondary crusher, they are again fed by the 24-inch conveyor belt to the triple-deck vibratory screen.

Material passing through the top deck of the triple-deck vibratory screen, but rejected by the 1-inch mesh of the middle deck, goes directly to the "3-A" stock pile.

Material passing through the middle deck of the triple-deck vibratory screen, but rejected by the ½-inch mesh of the bottom deck, is called a "No. 2" stone and goes directly to a stock pile in which "No. 2" and "No. 1" stones are mingled in aggregate specification proportions.

Material passing through the bottom deck of the triple-deck vibratory screen is chuted onto a double-deck 3-foot x 10-foot wire mesh vibratory screen.

Pieces that will not pass through the ¼-inch mesh top deck of the double - deck vibratory screen are called "No. 1" stone and are chuted to the stock pile in which "No. 2" and "No. 1" stone are mingled in aggregate specification proportions.

Pieces that pass through the top deck of the double-deck vibratory screen, but are rejected by the ⅛-inch mesh of the bottom deck, go directly to the "1-A" stock pile.

Particles passing through the bottom deck of the double-deck vibratory screen are classed as dust and used only for such purposes as stemming the blast holes in the quarry, driveway fill, etc.

A 12-ton capacity Sterling dump truck is used to haul crushed stone from the crushing plant to the storage yard at Davenport Center, assisted at times by 2-yard Ford, Chevrolet, and Dodge trucks. A Haiss portable loader with caterpillar treads loads the crushed stone onto the trucks.

● Drainage pipe trenches on the Tompkins contract were excavated and backfilled by this Bucyrus-Erie ⅜-yard shovel.

No serious accidents have occurred, either on the highway job on which 110 men worked or at the quarry where 17 men are employed. First aid equipment is carried in utility and service trucks, in the field office and at the quarry scale house.

New York State officials responsible for this highway job are: Arthur Brandt, superintendent of public works; H. O. Schermerhorn, commissioner of highways; F. W. Donovan, district engineer in charge; Theron Lusk, senior engineer in charge; and Carl Schaumloeffel, senior engineer inspector.

William Gardner is superintendent for Robert E. Tompkins, and A. E. Tower and E. M. Crowley are, respectively, office manager and timekeeper.

Dragshovel Vs. Hand

(Continued from page 25)

That, in a batch of dry statistics, is the proof of Kressly's miracle. A new operator, just breaking in on the machine, has knocked out 300 yards in 8 hours. That's 7.1 cents for excavation. A Bucyrus-Erie representative, demonstrating the machine, made a swing with the little excavator in 15 seconds. So it isn't at all unreasonable to assume that in a few more shifts the present operator will get the "feel" of the 10-B and approach the demonstrator's rate of throwing out the earth and boulders.

City Engineer Kressly's little idea stands a good chance of putting in for the City of Azusa a modern sewerage disposal plant well on the black side of that $140,000. The saving on excavation will no doubt more than pay for the machine. After the job is finished, the city will have saved money and still have the 10-B. The operation of the machine will also release the ditch digging crew of WPA men for other necessary work around the city.

An unusually good job of stone masonry is going into the rotary sprinkler filter structure. Native stone is being shaped and laid skillfully by stonemasons to form the circular wall of the structure. The concrete structures of the disposal plant are all being poured with a Rex ½-yard paver, using aggregates and cement furnished on the job site by the city. All of the work is being pushed toward completion as fast as possible.

Other features of interest around Azusa are acres and acres of oranges, grand scenery, and a host of pretty lasses who have a way of winning southern California beauty contests. Any writer assigned to Azusa to present the facts as he saw them would face a cruel choice between these winsome faces and the sewerage plant down on the low side of the railroad tracks. It is with tremendous strength and reserve, therefore, that this article stuck to the sewerage plant, to give you fellows what you like to read about.

EXCAVATING ENGINEER

A Monthly Publication

Devoted to the Excavating Industry

The Excavating Engineer Publishing Co.
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"Roads For Defense"

By Robert E. Harper

Director of Public Relations
American Road Builders' Association

Highway construction in 1941 will again cast the road builder in the leading role of defense worker. This is not the first time American road builders have marched behind the flag with the soldier, sailor, marine and in support of industries that make adequate preparedness possible. American road builders, from yesterday's mud lanes to super-highways for tomorrow's streamlined travel, clear the way for America's march of progress. The road builder was ally to the explorer, settler, soldier and trader in wars for independence and union — in efforts to build a nation from a wilderness. Through forests, over mountains, across plains—America's, first lifelines were built. These roads pioneered commerce and culture.

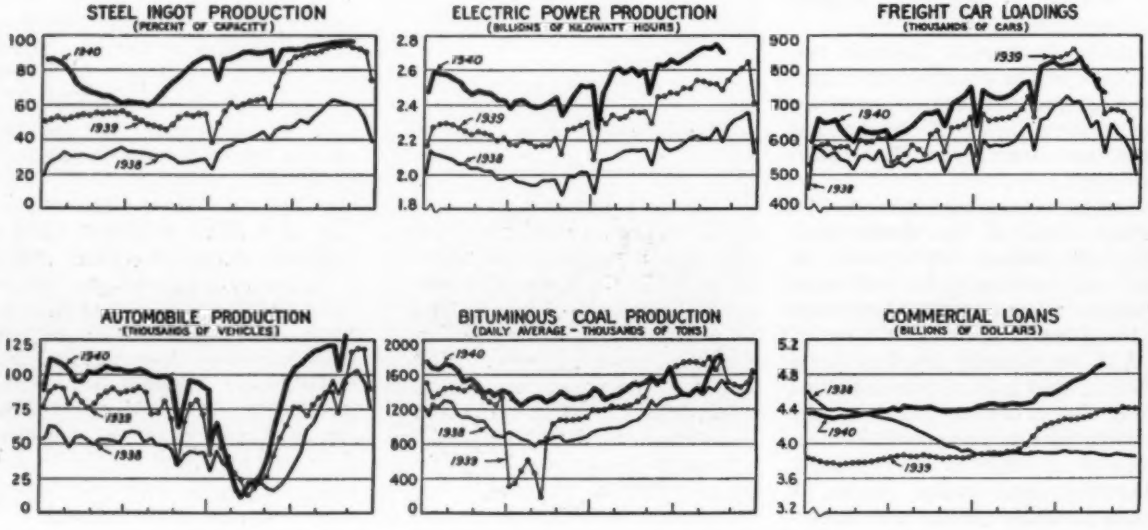
Highways made America strong and safe. The defense and the development of America today still depend on 3,000,000 miles of highway. Roads rule the world and the genius of the American road builder can make America the No. 1 highway nation of the world. So, in 1941, the preparation of adequate routes for unimpeded use by the militia will be the "must" assignment for the road planner and the road maker. This duty easily takes on the aspect of a gigantic undertaking. But all indications, at this time, point, instead, to the prosecution of a road-and-street construction and improvement program that will follow the pattern of normal times. Highway projects will, however, be so selected and so designed that they can readily become strategic links in a competent national defense system.

Highway preparedness attention will be centered on the construction of much-needed access roads to lead to newly selected and established military training camps throughout the nation. Total mileage in this proposed highway - construction program, according to War Department and Federal Works Agency estimates, approximates the 3,000 mark. In these new cantonments, military experts stress the education of Uncle Sam's manpower to handle new army equipment. They train recruits to the change in mechanized infantry combat tactics. It is also the duty of the nation's highway experts to point out the tested advantages of employing the newest and and most economic road-building machines, materials and methods.

"Roads for Defense" is the banner under which the highway industry and profession will march in 1941. Every road builder must concentrate his energy in the new year on the business of deriving a formula that will assure him the best way to perform his job to bring about sufficient U. S. highway preparedness. Government spokesmen point out glaring inadequacies in 75,000 miles of what is termed "the most strategic system." Four thousand miles, it is said, are less than 18 feet in width—14,000 are deficient in surface strength. This listed obsolescene is, however, only a small portion of America's great total of highway incompetence. The secondary or farm-to-market system — the all-important food and raw-material supply route—cannot be expected to sufficiently serve emergency demands in its present condition.

To combat the nation's highway evils, about $300,000,000 in Federal funds will be available for highway construction on the first of the year. This amount includes carryovers from previous authorizations and allocations under the 1940 Federal Highway Act for

WEEKLY BUSINESS INDICATORS

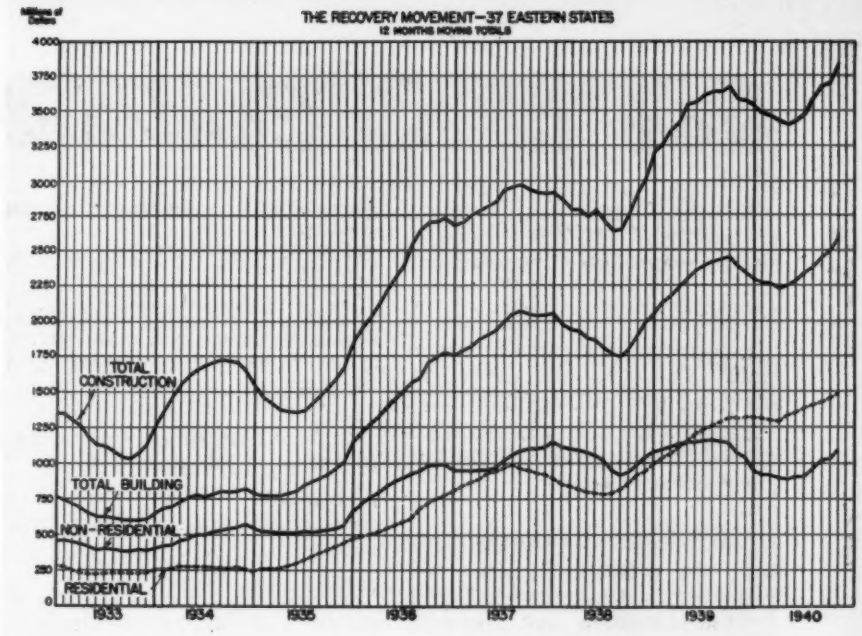


the fiscal year 1942. So, this Federal aid will sustain the momentum of the nation's road-building program and will help to keep this imperative national activity up to the peacetime level. But practical road men — administrators, planners, engineers and builders—in every section of the country maintain that this expenditure is far from enough. They point accusing fingers at the outworn bridges that fetter the American highway system. They are joined by military and other federal authorities in labelling 20,000 spans on the primary arteries as not being capable of carrying the new motorized and mechanized equipment of modern warfare.

Twenty-four hundred structures on the first priority system are condemned — 500 additional bridges do not meet the 18-foot standard width or the 12½-foot overhead clearance. Large-scale improvement is an absolute necessity. Like all industry under the pressure of defense preparation, the production of road building must be geared for greater speed, for increased completion in less time.

The necessary steps will be taken in the forthcoming session of Congress, it is believed, to formulate and consumate highway legislation which will eradicate the country's road emergency that is a direct threat to the efficient and effective operation of the army's rubber-tired military might. Best illustration of the fact that good roads go hand in hand with competent motorized army maneuverability is found in recent war games in various parts of the nation. Road failure was, in many instances, the deciding factor in the success of one force over the other. Consensus claimed that such transportation travesty, under actual war conditions, would mean devasting defeat, perhaps complete annihilation. To exterminate this "inside" enemy, the road builders of America are ready to do battle against the forces of highway obsolescence. They are fully equipped and prepared to erect a road system second to none in the world. Concerted action by and full co-operation of lawmaking bodies, governmental agencies and state highway-interest groups will shift American road building into high gear — will make its workmen and its tools ready, willing and able to meet every defense demand.

When all the highway men of the two Americas are brought together under one roof, at one time, at the 38th annual convention of the American Road Builders' Association, at the Hotel Pennsylvania, in New York City, January 27-31, 1941, they will seek to put the road-building house in order—they will recreate a master plan to produce national and hemispheric highway modernization. This is defense of the most definite denomination. This is a New Year resolution that is skin-close to the well-being of every American citizen.



• This Dodge chart presents the recovery movement in the construction industry from 1933 to 1940.

"Uncle Sam" Buttons

Now that the November elections have out-dated the political emblems of both parties, all members of Uncle Sam's family can unite in wearing the new patriotic emblem illustrated below.

Conceived and designed by Jay O. Lashar of the American Chain & Cable Company, Inc., the buttons are truly patriotic, as all royalties derived from their sale are being turned over to the American Red Cross Society by Mr. Lashar.

Uncle Sam's nephews and nieces have already expressed their approval of this really worthwhile patriotic emblem. Various individuals, publishers, chambers of commerce, and American Red Cross Chapters interested in the non-political, humanitarian purpose of the buttons have found a widespread public acceptance for them.

Excavating Engineer readers can get the Uncle Sam buttons at the following prices:

1,000	$27.50
2,500	56.50
5,000	99.50

Orders for buttons should be sent direct to Parisian Novelty Company, Chicago, Illinois, who have been granted the sole license to manufacture them. Prices for amounts under 1,000 will be sent upon request to the above company.

Construction Volume to Hit Eleven Year High in 1941

The largest construction volume since 1930 is anticipated for 1941 by F. W. Dodge Corporation, who estimate the 1940 building and engineering contract total for 37 eastern states at $3,850,000,000, and set the figure for 1941 at $4,400,000,000, an indicated overall increase of 14 per cent.

Construction for the defense

(*Continued on page 74*)

NOT in the *Contract*

Breathes there a man with soul so dead, who never hath turned his head and said, "Hmmm, not bad!"

Reformer: Young man, do you realize that you will never get anywhere by drinking?

Stewed: Ain't it the truth? I started home from this corner five times already!

A ship called at a Cannibal Isle and was surprised to see the missionary come out in a canoe.

"How on earth did you ever keep them from eating you?"

"It was easy. You see, I have a cork leg. As soon as I landed, I pulled up my trousers, cut off a slice and handed it to the chief. He decided I wasn't worth cooking."

There was a young lady named Banker,
Who slept while the ship was at anchor,
But she awoke with dismay
When she heard the mate say,
"Now hoist up the sheet and spanker."

Wife: "Just suppose we wives should go on a strike?"

Husband: "Go right ahead. I've got a peach of a strikebreaker in mind."

Maizie—"I didn't see Jack at the party last night, but I hear he acted the part of a thoroughbred."

Dora—"What part?"

"Do you know the difference between a popular girl and an unpopular one?"

"Yes and no."

"I'm afraid you'll never be any good as a ditch digger, Jenkins!"

Propriety

A young lady found herself for the long week-end with a notoriously strait-laced country family in England. Fearing that the pajamas she wore instead of a night-gown might be considered improper, she carefully hid them every morning when she got up. But one morning, at breakfast, she suddenly realized that she had forgotten them, that they were lying brazenly on her bed. Excusing herself, she rushed to her room. The pajamas had disappeared.

While she was feverishly hunting for them, looking vainly through the closets and drawers, a dour, elderly maid appeared at the door and surveyed the scene. "If it's the pajamas you're looking for, Miss," she said, "I put them back in the young gentleman's room."

A mother was telling her little girl about the suffering of early martyrs and to illustrate the story showed her some pictures of scenes in the Roman arena where Christians were being fed to the lions.

Pretty soon the little girl burst into tears. The mother felt sure she had made a lasting impression on the child until between sobs she said:

"Look, mother, there is one poor lion without any Christian."

Petunia Jackson remarked, when shown her new-born infant, "He looks jess lak his pappy, if ah remembahs right."

From one of the local grade schools comes this tale of party politics:

Teacher: Who gave us this beautiful school?

Pupil: President Roosevelt.

Teacher: Who keeps the roads so nice?

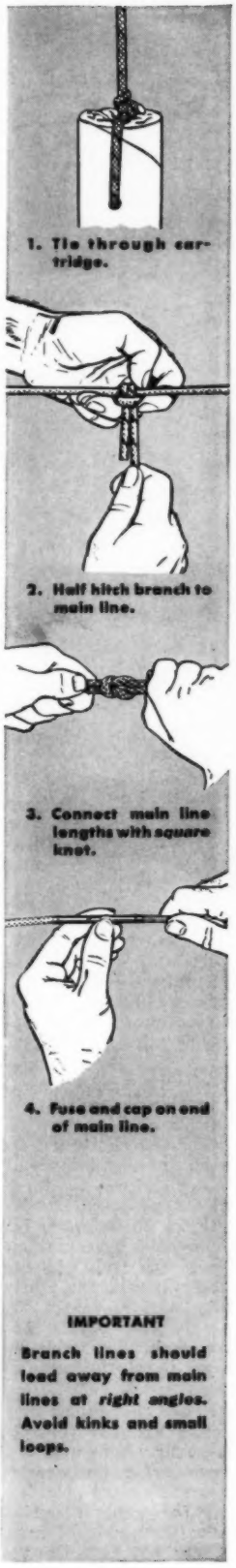
Pupil: President Roosevelt.

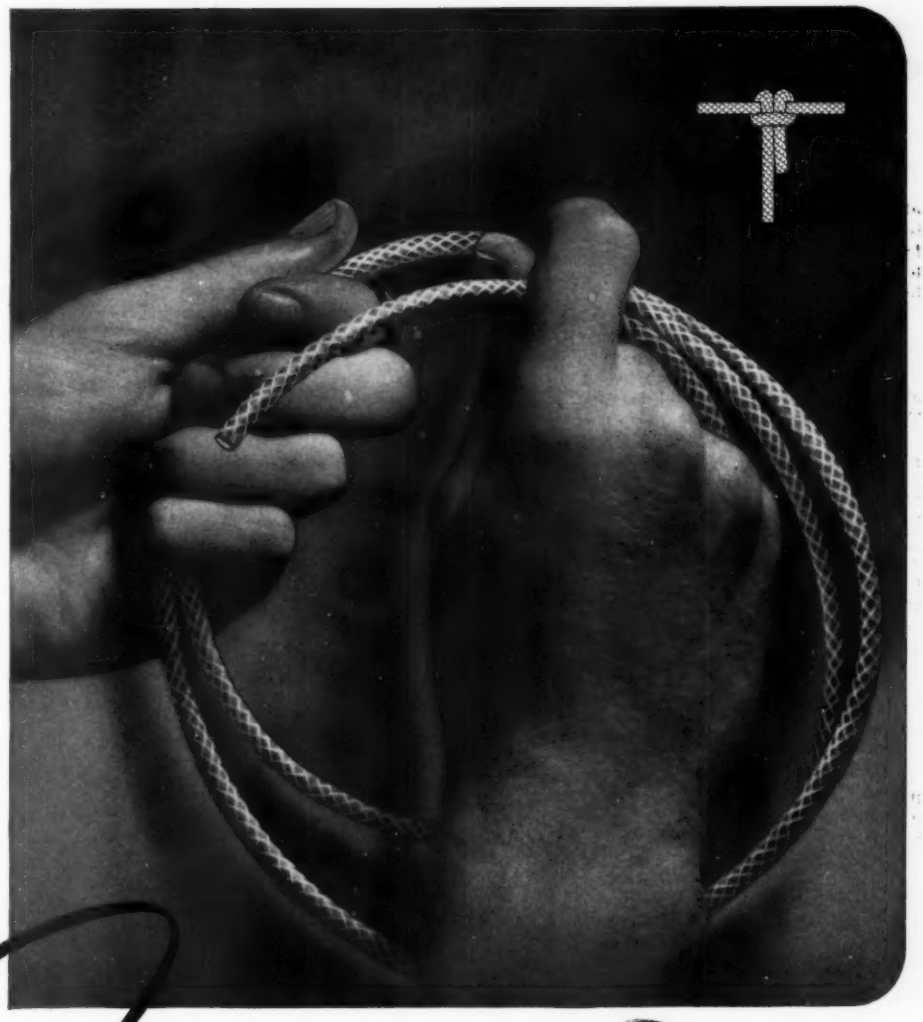
Teacher: Who made the trees and flowers grow?

Pupil: God.

Voice from rear of room: Throw out that d____ Republican.

They were dining at a roadside tavern when he insisted, "Why wait until we get home to tell me whether you'll marry me or not?" And she explained, "I'm scared; this is the exact spot where father proposed to mother, and on the way home, the horse ran away and father was killed."


1. Tie through cartridge.
2. Half hitch branch to main line.
3. Connect main line lengths with square knot.
4. Fuse and cap on end of main line.
IMPORTANT
Branch lines should lead away from main lines at right angles. Avoid kinks and small loops.



For profitable Blasting

Primacord acts as the detonating agent for each cartridge in a hole. It is also employed to connect holes in firing order planned for proper relief of burden.

It consists of a core of PETN, a powerful detonating agent which produces an explosive wave of nearly four miles per second. Due to the special textile covering, Primacord-Bickford Detonating Fuse has great flexibility, is light in weight, and has adequate strength and waterproof qualities. Send for the Primacord Book — it's free.

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PB 39

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Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse since 1836

For your convenience in writing to The Ensign-Bickford Co., you will find a card bound in this issue.

Shots from the FIRING LINE

Panama Canal Bids

Bids for the excavation of a third set of locks for the Panama Canal, designed to be bombproof and to make the canal less vulnerable to accident or air attack by a potential enemy, have been opened by the officials of the Panama Canal Administration.

The low bid was submitted jointly by the Martin Wunderloch Company, Jefferson, Missouri, and the Okes Construction Company, St. Paul, Minnesota. Their offer was $8,517,000.

Other bids follow: S. A. Healy Company, White Plains, New York, $8,892,900; Panama Constructors, Wilmington, Delaware, $10,965,950; B. Perni & Sons, Inc., and Rugo Construction Company, Inc., Framingham, Massachusetts, $9,285,180, and W. E. Callahan Construction Company and Gunther & Shirley Company, Dallas, Texas, $8,846,200.

The new locks are to be made bombproof through a method which is a military secret. They will be 140 feet wide, 30 feet wider than the present locks. This will permit larger battleships and airplane carriers to use the canal.

The locks will form almost a separate canal, officials pointed out, roughly paralleling the present set at a distance of a mile and a half. The new locks are to be used only by the U. S. Navy.

Congress authorized $277,000,000 for the locks last year. While original estimates allotted six years for the job, it is hoped to cut a year to 18 months from this time, because of present national defense plans.

Dedicate Arroyo Seco Parkway

By Floyd Suter Bixby

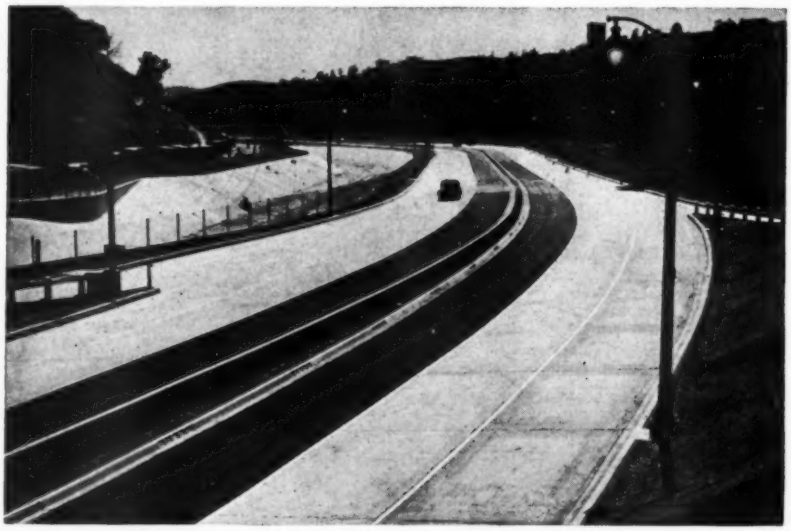
Back in the days of the Spanish dons, native Indians took three suns, meaning three days, to trek between what is now Los Angeles and Pasadena. They followed the ancient trail of the Arroyo Seco, which means "dry river."

But the black-robed padres were quick to modernize. They charted a route reducing the journey to two days. That included a night stopover in what is now Highland Park.

It is a matter of 13 minutes now.

The answer to what makes this amazing time possible is the new $5,648,000 Arroyo Seco Parkway, all 7.1 miles of it, which was dedicated on November 11, 1940. Of the total length, all but 1.1 miles is finished and A. N. George, construction engineer of the California State Highway Department estimated that the remaining part of the parkway would be completed by the time this is published.

"The Arroyo Seco Parkway is more than a connecting link between two great communities," declared Mayor Fletcher Bowron of Los Angeles. "It brings the community 'good neighbors' now that much closer."



• Completed section of California's Arroyo Seco Parkway. Inside passing lanes are plant mix black top. Note concrete channel at left which carries the Arroyo Seco during wet weather.

"And this is only the beginning. In comparatively few years we will have freeways in all directions, serving to bring closer relations between cities and minimizing fatal traffic accidents, of which there are entirely too many at present," he added.

The short route between Pasadena and the North Figueroa entrance to the downtown section of Los Angeles follows the straight route of the Arroyo, normally a dry river bed except during winter rains. To take care of rainy season water in the river, a special channel was built throughout the length of the new parkway for the stream.

Financed by state, county and PWA funds, the project involved excavations in close quarters, removal of existing utilities, and the design of a highway and appurtenant structures suited to a limited right of way. The last contract on the system was let in June, 1940 to J. E. Haddock, Ltd., of Los Angeles.

Month by month, Los Angeles is pushing an extensive highway program designed to branch out in all directions with modern super speed multiple lane express highways capable of taking the brunt of heavy automobile travel.

In addition to Mayor Bowron, other notables participating in the ceremony were Mayor E. O. Nay of Pasadena, Congressman Carl Hinshaw, and Wright L. Felt, project engineer, Public Works Administration.

AGC of West Virginia Seek Registration Law

By Bethune Jones

Passage by the 1941 West Virginia Legislature of a bill requiring registration of all general and specialty contractors will be sought by the Associated General Contractors of West Virginia, according to an announcement in Charleston by C. J. Kuhn, president.

Membership of the registration board, under the proposed plan, would be bipartisan. Fees charged for registration would cover all administrative costs. The measure would be modeled after a similar California statute, Kuhn said.

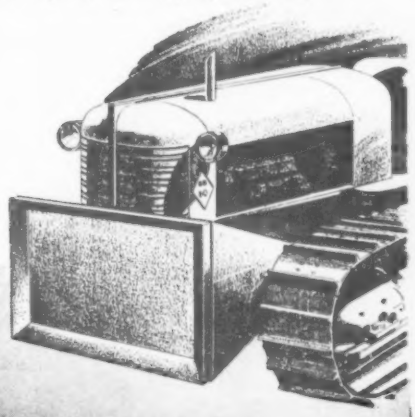
"The prime purpose of the act," Kuhn said, "is to eliminate irresponsible contractors whose operations result in default and delays that not only cause direct losses but invite unsettled conditions in local building operations. It is the association's desire to protect the public and at the same time the legitimate contractors and raise standards of construction."

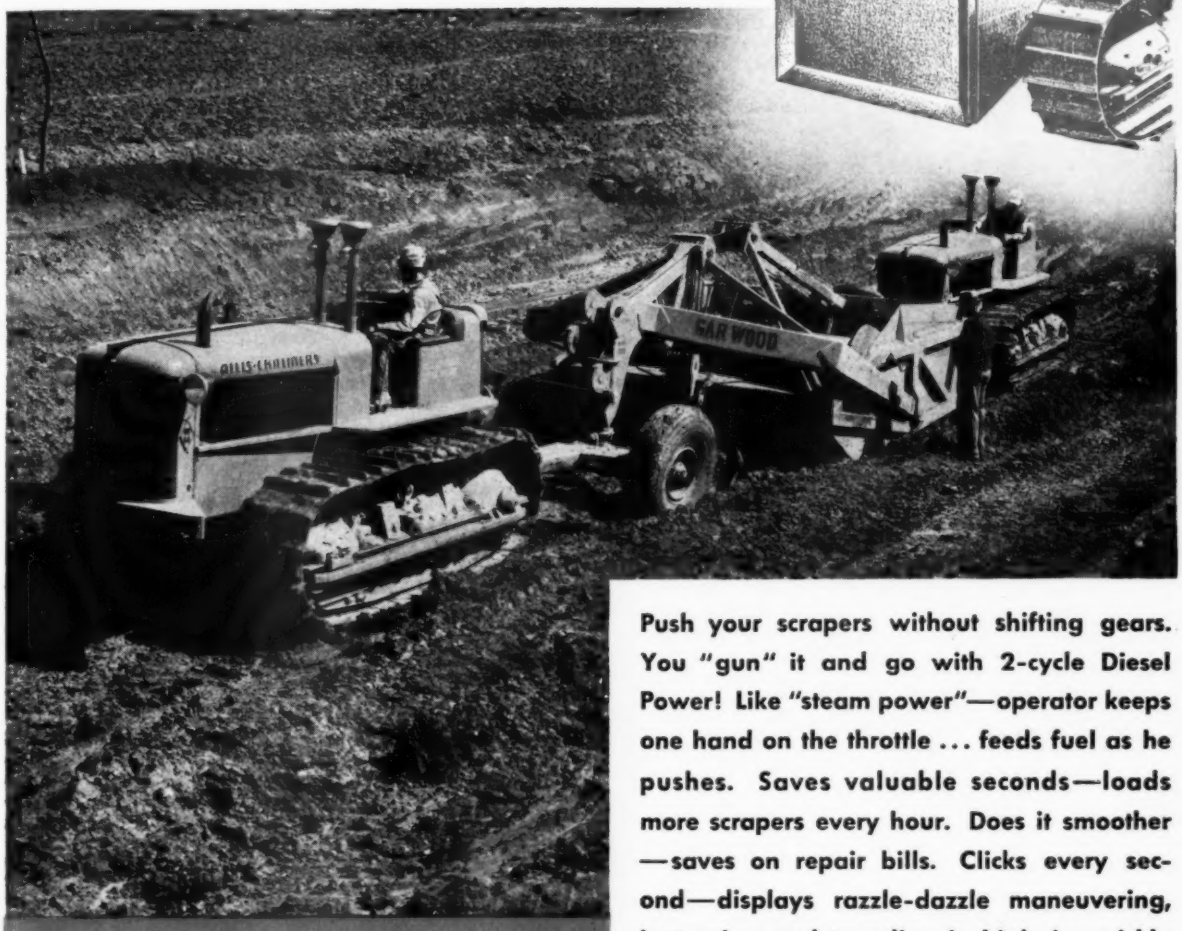
Sponsorship of the proposed legislation is in line with the objectives of his organization, Kuhn said, pointing out that membership in the state chapter is a reasonable assurance to the public of skill, integrity and responsibility. The chapter, he said, only admits contractors who have established an honorable reputation on these fundamental points.

Noting that the state road commission required prospective highway contractors to establish qualifications and that various factors were taken into consideration before contracts were awarded, Kuhn declared: "The general public, which includes the thousands of families that each year contract for the

WAKE UP "LAZY LOADING"

PUT MORE ZIP BEHIND THE BOWL WITH HD-14 PUSHERS





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TRACTOR DIVISION – MILWAUKEE, U.S.A.

2-CYCLE DIESEL POWER

3 SIZES
HD-7, 54 H.P.
HD-10, 79 H.P.
HD-14, 108 H.P.

Push your scrapers without shifting gears. You "gun" it and go with 2-cycle Diesel Power! Like "steam power"—operator keeps one hand on the throttle ... feeds fuel as he pushes. Saves valuable seconds—loads more scrapers every hour. Does it smoother—saves on repair bills. Clicks every second—displays razzle-dazzle maneuvering, in turning and traveling in high, in quickly getting into position for every load.

This same power on the front of your Gar Wood scraper assures bigger loads ... more trips every hour ... longer profitable haul distances.

Put an extra shot of life into your dirt-moving. Let your Allis-Chalmers dealer prove you can do it.

For your convenience in writing to Allis-Chalmers, you will find a card bound in this issue.

• A 5-ton drum section is swung into place on the Sepulveda Dam spillway by a Koehring 801 crane.

building of homes, deserve such protection."

The West Virginia Chapter of the Associated General Contractors was organized in April, 1940. Its offices are maintained in Charleston, with S. Victor West as secretary.

Louisiana Engineers Meet

Convening for a two-day program on January 10 and 11 at the St. Charles Hotel, New Orleans, the Louisiana Engineering Society will devote its annual meeting to a series of technical papers by engineers of nation-wide importance.

Varied inspection trips and entertainment will supplement the technical portion of the meeting. K. P. Kammer is the incoming president of the organization.

Contractors Push Sepulveda Construction

With concrete work on schedule, executive attention is now focused on the installation of more than 1,000,000 pounds of radial drum type crest gates in the spillway at Sepulveda Dam. The Jahn-Bressi-Bevanda Company of Los Angeles is building the earthfill structure under a $3,127,000 contract with the Los Angeles office of the U. S. Engineers. (See feature article, Excavating Engineer, September, 1940.)

Seven complete sets of gates, each assembly weighing over 50 tons, are being installed in the spillway section of the massive dam to raise or lower the spillway crest at will, thus regulating the potential reservoir crest in times of flood. The gates are of a free floating type, floating in a gate chamber recessed in the concrete ogee section of the dam.

Although the construction of the gates under a separate contract with the Consolidated Steel Corporation of Los Angeles was classed as a structural job, many parts of the gates were machined to fine tolerances. The 50-ton assembly rides on nine hinges with hinge pins holding the gates firmly in place. The whole assembly sets on 1½-inch anchor bolts imbedded deep in masonry.

Hinge assemblies are set before the drums are lowered into place. The hinge bearings are set to line and grade with surveying instruments to within one thousandth of a foot. Nuts on the anchor bolts are then tightened and the drum section is ready to be assembled. Because the drum sections are so heavy, it was found best to set the hinges unusually close, so the pins would line up perfectly.

A complete drum section is assembled from 8 five-ton sections. Each section is lowered into place in the gate chamber. The sections are bolted together from the inside with 1-inch turned bolts and each section is electrically welded completely around the outside.

With the exception of a few pipeline jobs, this is one of the largest field welding jobs in operation around Los Angeles. The welding method is unusually systematic. Two Lincoln arc machines are used. Welders are kept "scattered" over the drum section. A light stringer bead is run with 5/32-inch Fleetweld rod and the bead is peened with a No. 2 Chicago Pneumatic hammer to distribute assembly stress. From two to four filler beads are then run, using 3/16-inch rod. These fillers are also peened while warm.

The inside and outside of the drum sections are being painted with a special bituminous coating manufactured by the Barrett Company of New York. After the drums are sandblasted clean, the gray steel is primed with a quick drying primer and the enamel is then applied at a temperature of from 485 to 525 degrees Fahrenheit. It is spread by skilled workmen using tampico fiber daubers. The painters use special masks and cream coatings on exposed parts of their bodies to prevent serious skin burns. According to the manufacturer, this enamel will give perfect protection to metal over a long period of years.

All the heavy lifting of gate assemblies is done with a Koehring 801 crane or a Bucyrus-Erie 55-B dragline. With Jahn-Bressi-Bevanda concentrating on the earth fill adjacent to the spillway, it looked like old home week for Bucyrus-Erie, for the Smith-Booth-Usher Company of Los Angeles conducted a demonstration of the new Bucyrus-Erie S-146 scraper. One of subcontractor Ted Page's Caterpillar RD-8 tractors was fitted with a Bucyrus-Erie P-24 power winch to handle the new scraper.

Working in damp adobe and clay, the scraper came out of the borrow pit well filled with dirt each trip, loading with a "boiling" action which insured full loads in wet material as well as in drier soils.

With fill equipment working all over the short earth plugs, the work area was more than congested. Working around the counterforted concrete walls of the spillway was easy for the S-146, however, for the short turning radius of the scraper made it easy to dump and get out. Several contractors visited the job to watch the first demonstration they had seen of the machine.

Sepulveda Dam is scheduled to be completed by August, 1941. With rain continually threatening, the contractors are pushing their equipment and crews to get the big dam finished safely and on schedule.

Colonel Iry Transferred

Lt. Col. C. N. Iry, district engineer of the Fort Peck District, has received instructions to report to Fort Belvoir, Virginia, to assume new duties in line with the present defense program.

Colonel Iry, one of the first army engineers assigned to the Fort Peck Dam, has been active in every phase of its construction. A graduate of Purdue University with a Bachelor of Science degree in electrical engineering and of the Graduate Cavalry School for Training Officers, Colonel Iry has had considerable experience as an engineer on many types of construction as well as with army activities so vital to the country's safety at the present time.

Major Selee, a member of the Corps of Engineers at Fort Peck since June, 1939, will act as district engineer pending definite assignment.

Friant Dam Well Underway

Construction activity at Friant Dam, after a year of work, is approaching a peak with concrete pouring operations being expanded on a rapidly increasing scale at the base of the dam site in the old San Joaquin River gorge. Meanwhile, at the top of the Fresno County abutment a 500-foot section comprising the southerly end of the dam is virtually completed.

R. B. Williams, construction engineer for the United States Bureau of Reclamation has announced that the maximum height of Friant Dam will be 320 feet, confirming the official estimate made prior to excavation. The exact height was determined by the final cut in the deepest portion of the foundation which was found to be in Block 33 at the base of the south abutment.

In a report to R. S. Calland, acting supervising engineer of the Central Valley Project, Mr. Williams stated that the lowest point of sound bedrock in the dam site was revealed to be at elevation 262. The crest of the dam is to be at elevation 582. The difference, 320 feet, makes Friant Dam 20 feet higher than the tallest building in the San Joaquin Valley, which is Fresno's Pacific Southwest Building. Friant Dam will be 3,430 feet long.

The first "lift" of concrete at the lowest point was poured in November, 1940. Concrete placement in other blocks of the middle section of the dam is well under way. At Block 41 in the trough where the river once rolled, the excavation went down to elevation 266,

(*Continued on page 42*)

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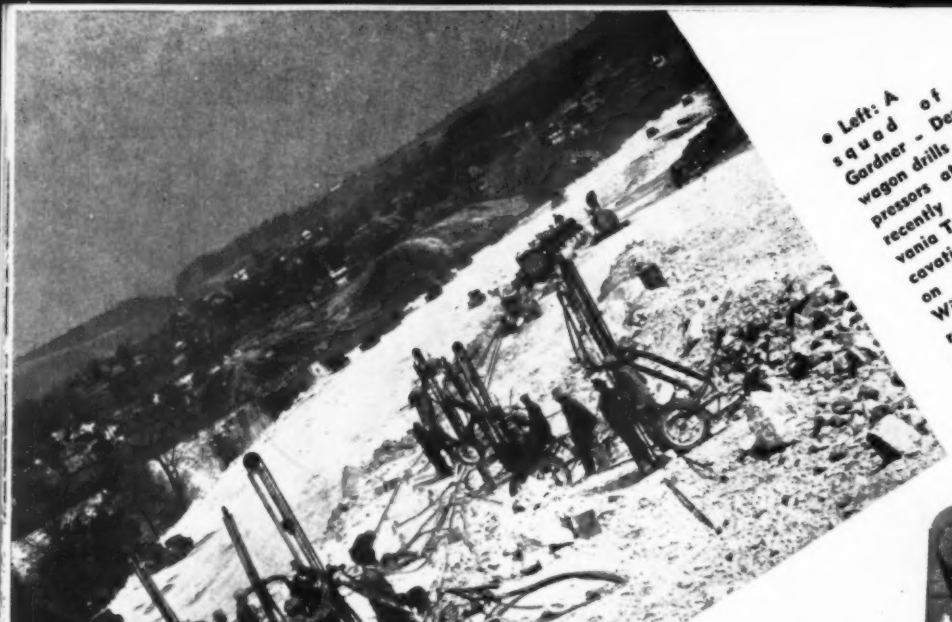

• Left: A squad of Gardner - Denver wagon drills and compressors at work on the recently dedicated Pennsylvania Turnpike. Below, right: Excavation for a concrete drainage arch on a highway relocation project near Wilkes-Barre is handled by a 3/4-yard Bucyrus-Erie. Reed & Kuhn of Elysburg, Pennsylvania, hold the contract.

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eiss mobile loader at the
raens Sand & Gravel Com-
any, Wyckoff, New Jersey.

AMERICA'S HIGHWAYS

• Left: A Caterpillar-to
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• Above: An International tractor — Bucyrus-Erie scraper combination at work for McGuire Brothers on a 5½-mile grading job on Route 3 near Leon, Iowa. Right: Hard-away Construction Company places a sand-asphalt road in southern Mississippi with a Barber-Greene "travel plant." The ma-chine scoops up the windrow of previously placed sand, mixes it with asphalt, and deposits the finished mix ready for grading.

Shots . . .

(Continued from page 38)

about 25 feet below the former streambed.

Turned out of its natural channel by an upstream cofferdam and dike, the San Joaquin River is flowing through a temporary diversion channel along the south bank, crossing the dam site excavation on a big wooden flume. Later in the season, when the winter flow exceeds the 10,000-second-foot capacity of the flume, the river will be diverted again into three plate-steel conduits, each 14 feet in diameter and about 200 feet long, which soon are to be installed in the base of the dam.

Griffith Company and Bent Company, the general contractor, is rushing work night and day in an effort to get concrete poured around the diversion conduits before the flood season. December's schedule called for concrete placement averaging almost 7,000 cubic yards a day in a total of about 20 blocks at the base of the dam.

Concrete is dumped into the forms, eight tons at a time, from four-yard buckets lowered into place by large traveling cranes which move along the construction trestle still being extended across the dam site. The loaded buckets are brought out on the double-track trestle by diesel-electric trains constantly running back and forth from the mixing plant high on the south side of the canyon.

Foundation excavation for Friant Dam is almost completed, although some weathered rock still is being removed from the Madera County abutment. The excavation is expected to total about 1,300,000 cubic yards of earth and rock.

Exposed bedrock is thoroughly cleaned of all loose material and even washed and scrubbed before concrete is poured. Cleanup operations are under way in some blocks at the base of the dam site and on the north abutment, along with preliminary grouting of the foundation rock to seal all hidden seams and cracks.

Flood Control in Los Angeles

By Herbert C. Legg

Outstanding among the many public works being carried forward to solve the major engineering problem of storm water disposal in the Los Angeles metropolitan area, is the huge Olympic Boulevard storm drain nearing completion as a WPA project. It is designed to drain surface waters from 700 acres of rapid-runoff area in the main business district of the city.

Secondary to the problem of the project itself has been that confronting engineers—to conduct operations in a congested downtown area so as to create the least disturbance to normal business functions of a busy shopping and wholesale district.

Los Angeles' flood problem is in part common to all the western coastal area where, during the rainy season, flash floods from nearby mountains pour into dry river beds, arroyos and washes and often cut new channels through level plains. But in larger part, the modern problem has been caused by rapid building and paving of an area equal to that of New York and Chicago combined. New development has accelerated and often obstructed and diverted the normal runoff, creating new stormwater problems with the development of each new subdivision.

The Olympic Boulevard Business District Storm Drain, a portion of a larger project, serves the area from the Los Angeles River (main artery of the flood control system in metropolitan and suburban Los Angeles) to Figueroa Street and from Sixth Street to Olympic Boulevard, approximately 700 acres in extent.

Basic nature of the whole undertaking is a reinforced concrete mainline of 48,725 linear feet, all underground, along Eighth Street from the Los Angeles River to Wall Street, north to Sixth Street and south to Olympic, then paralleling Olympic to Flower Street.

Decision to construct the drain in tunnel rather than in open cut was reached when the cost of tunnel construction over open cut excavation was found not to be materially greater. The added cost of hauling excavated earth in and out was considered along with the cost of relocating underground structures and utilities, shoring trenches, and restoring the street surface.

For the tunnel and paralleling backfilled trench now completed or under construction, totaling 15,125 linear feet, 175 catch basins, 170 small junctions, and 55 manholes are being constructed. Pipe of cement and reinforced concrete 2 feet by 4 feet is being used for the 10,700 linear feet of laterals and catch basin connections necessary for Unit No. 1.

About 33,400 cubic yards of concrete, principally 1-2-3 mix, that have been used or are required for the above construction; 52,100 bbls. of cement; 24,150 tons of sand; 34,700 tons of rock; 1,460 tons of reinforcing steel in round deformed bars; 715 tons of structural steel used as beams for tunnel sets; 110,000 feet B. M. rough lumber for tunnel lagging and trench timbers; 500 linear feet reinforced concrete pipe for manhole shafts; and 10,700 linear feet of 1 foot by 4 feet in diameter cement and R.C.P. for shafts.

Much of the material through which the storm drain has passed is river sand. This has made excavation comparatively easy, but has required tight sheeting to prevent loss of ground. An interesting feature of the work has been the disposal of this excavated tunnel sand. The sand removed has been stored in bunkers located at each shaft, and has then been hauled away at night.

The shafts to the tunnel are approximately 800 feet apart.

Unit No. 2 of the storm drain will be WPA's next task. For it, 33,600 linear feet of laterals are proposed, from 1 foot 3 inches in diameter pipe to 6½ feet arch tunnel. Proposed catch basin pipe connections of 1 foot to 2½ feet pipe will reach 15,000 linear feet. Approximately 1,000 catch basins, junctions, and manholes will be required.

Drainage area of the completed storm drain will be 700 acres, all of this from downtown Los Angeles, which lies on the Coastal plain between the Sierre Madre Mountains and the sea.

Sponsored by the City of Los Angeles, the Olympic Boulevard Business District Storm Drain is a unit of a city-wide project providing for improvement of drainage and flood control facilities by WPA, for which Federal funds amounting to $4,863,665 have thus far been allocated.

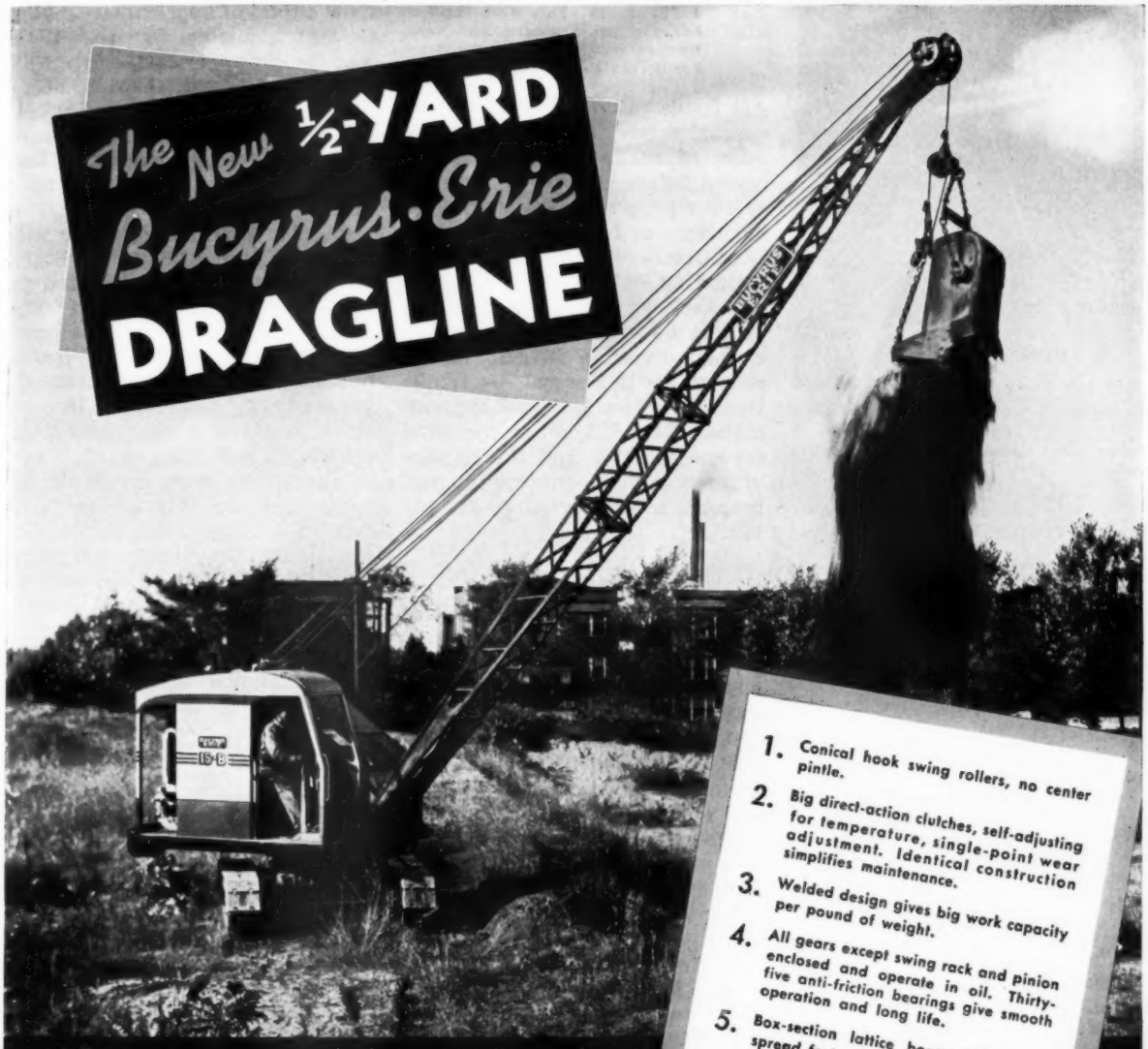
OBITUARY

Thomas Isaac Weston

Thomas Isaac Weston, president of the National Crushed Stone Association during 1938 and 1939, died on November 22, 1940 at Columbia, South Carolina at the age of 59. News of Mr. Weston's death comes as a sad blow to his many friends throughout the industry.

T. I. Weston was born in Congaree, South Carolina, April 15, 1881, the son of William W. and Sarah H. Weston. He was a graduate of The Citadel, the Military College of South Carolina, at Charleston, South Carolina. For a time he was County Engineer of Richland County, South Carolina, and was an Associate Member of the American Society of Civil Engineers.

In 1909, together with the late B. O. Brooker, he engaged in engineering and contracting. In 1912 his firm acquired a quarry interest, and he was engaged in business continuously after that time as The Weston & Brooker Company, of which he was president and treasurer until about a year ago when he became chairman of the company board of directors, in order to lighten his responsibilities due to impaired health. In 1930, Mr. Weston and his associates established a large crushed stone operation at Camak, Georgia, as an additional plant for his company.



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• "Skullgard" hats were familiar headgear on engineers and contractors' men working on the seven Pennsylvania Turnpike tunnels.

Highway Forecast

(*Continued from page 16*)

expected. Vehicle license fees and other income amounting to $2,510,516.75, plus $565,000 in regular Federal Aid and $146,250 in other Federal funds, makes up the total.

State equipment purchases amounted to approximately $50,000 during 1940. There was no diversion of highway funds in 1940.

Florida

Since Florida's state road department does not adopt a budget until March, it is impossible to obtain figures on the forthcoming program at this time.

Available figures on Federal Aid projects show that as of October 31, 1940, the state had 91.2 miles of Federal Aid highway under construction at an estimated cost of $3,020,271, of which Federal funds contributed $1,499,856. Approved for construction were 17.4 miles costing $840,971, involving Federal Aid funds of $420,485. Balance of funds available for programmed Federal Aid highway projects at that time were reported at $2,313,581.

Federal Aid secondary or feeder roads under construction in October consisted of 3.2 miles at an estimated cost of $509,329 of which $254,665 was Federal Aid. Projects approved for construction involved $173,817 in Federal Aid funds toward a total cost of approximately $398,579 for 17 miles of road. There was a reported balance of $194,942 available for programmed Federal Aid secondary or feeder road projects as of October 31, 1940.

On that date, Florida also had one Federal Aid grade crossing project under construction at an estimated cost of $37,626, all accounted for in Federal Aid funds. In all 26 projects, to cost approximately $194,523, were approved for construction and the balance of funds available for programmed projects was reported at $1,220,136.

Georgia

Funds expected to be available for Georgia's 1941 highway expenditures are estimated at $27,000,000 and include proposed construction totalling approximately $19,000,000. Maintenance has been allotted $3,000,000 in the preliminary estimates, with $5,000,000 going to other highway department expenditures.

Sources of the 1941 funds are: regular Federal Aid, $5,070,000; other Federal funds, $4,250,000; state gas tax revenues, $15,000,000; license fees and other state funds, $3,000,000.

No details of the construction program have been announced as yet. Federal work, according to government satistics issued as of October 31, 1940, included 311.4 miles of Federal Aid highway projects under construction at an estimated cost of $7,861,815 and 118.8 miles approved for construction at $2,387,793. On that date Georgia also had 64 miles of Federal Aid secondary or feeder roads under construction to cost approximately $763,874, and another 43.5 miles approved for construction at $438,698. Federal Aid grade crossing projects under construction totalled approximately $895,795 and those approved for construction amounted to $531,974.

Idaho

Estimates released by C. P. Humphrey, director of highways, show a total of approximately $5,488,000 available for the 1941 road program. Construction will amount to an estimated $3,638,000 while $1,600,000 is earmarked for maintenance and the remaining $250,000 will cover other highway department expenditures.

Regular Federal Aid funds will furnish about $1,680,000. State gas tax revenues are expected to total $4,583,000, of which $1,000,000 goes to counties and highway districts for construction, maintenance and payment of outstanding road and bridge bonds. Income from license fees and other state sources is estimated at $225,000.

No figures were available at press time on the amount and type of work contemplated under the 1941 construction program. Carry over from previous awards includes $330,000 on 1,200,000 yards of highway excavation.

State equipment purchases in 1940 amounted to approximately $30,000, and equipment rentals totalled about $600,000. No diversion of highway funds was made in 1940.

Illinois

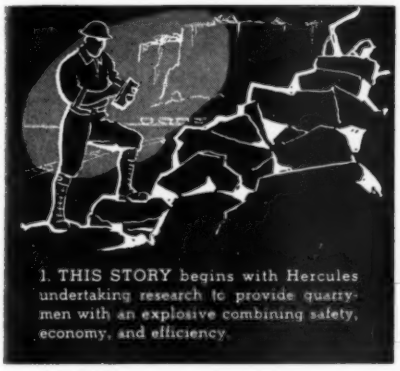
Figures on the state's complete program for 1941 have not been compiled, but officials estimate that they will closely approximate those for 1940 which indicates a total of about $19,800,000 for construction and $6,500,000 for maintenance.

Federal allotments for the coming year are expected to be about $5,782,000 and a total of approximately $14,750,000 from state funds is expected to be available for construction.

No details of the forthcoming construction program are available at this time, but work totalling $9,500,000 to be carried over into 1941 includes 91 miles of paving, 52 miles of bituminous surfaced gravel or crushed stone roads, 87 miles of gravel or crushed stone surfacing, 55 miles of grading, 40 bridges, 9 railroad grade separations and 1 highway grade separation.

Equipment purchases in 1940 are estimated at $1,200,000 and additional equipment purchases

How HERCOMITE became the Standard Explosive for QUARRYING



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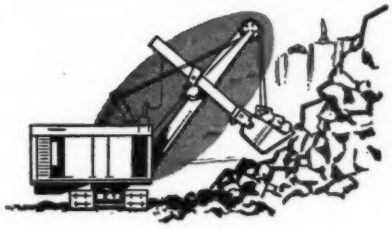

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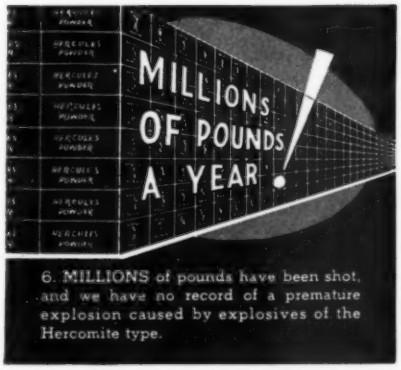

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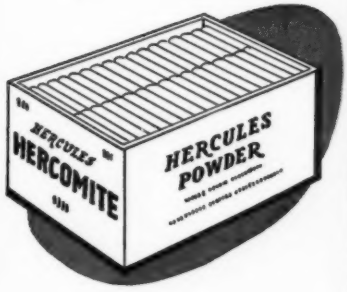

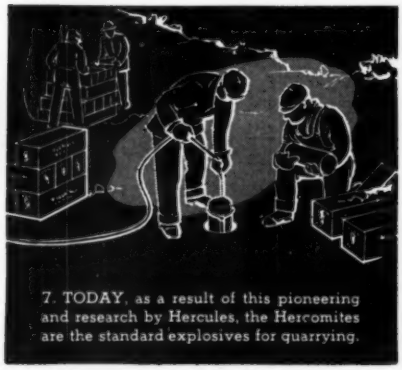

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totalling about $1,000,000 in 1941 are expected.

Indiana

Preliminary figures for Indiana's road program indicate a total of approximately $23,911,000 available. Construction work is estimated at $16,411,000, maintenance work at $4,500,000, with $3,000,000 to cover other highway department expenditures.

An approximate breakdown of the construction total indicates a division as follows:

	Approx. Miles	Approx. Amount
Grading and structures	290	$6,400,000
Surfacing—		
Grading, structures and gravel or crushed stone surface	14	366,000
Oil treatment (includes surface treatment)	700	840,000
Paving, high type	300	8,445,000
Paving, low type	110	1,750,000
Bridges—162—cost		3,690,000

Federal funds will contribute approximately $2,788,741 in regular Federal Aid, plus $1,122,312 in other Federal funds. An expected $20,000,000 will be derived from the state gas tax and vehicle license fee revenues.

In addition to the proposed construction work reported for the coming year, 3,000,000 cu. yds. of highway excavation at a cost of $900,000 which was previously awarded, will be carried over into 1941.

Equipment purchased by the state in 1940 amounted to $39,000 and an additional $75,000 was spent on equipment rental.

Iowa

Although definite figures are as yet lacking for Iowa's 1941 program, officials estimate the program will be substantially the same as that undertaken in 1940.

In detail, the state's total highway expenditures of $8,972,297.47 for the past year were:

PRIMARY ROAD SYSTEM

	Miles	Amount
Standard concrete paving	119	$2,831,393.43
Type A concrete paving	20	343,444.54
Grading	211	1,087,110.68
Graveling, 1st course	95	114,181.96
Graveling, 2nd course	55	26,808.08
Stabilized base & bituminous (oil) treatment	67	259,751.85
Bridges & culverts		999,474.82
Railroad crossing structures		95,363.71

FARM-TO-MARKET

	Miles	Amount
Type A concrete	¼	$ 12,414.24
Grading	516	1,186,061.71
1st course surfacing	338	285,961.50
Bridges & culverts		1,351,133.52
Grade crossing projects on secondary roads		155,923.60

The primary road fund for 1941 is estimated by officials at $5,575,272. Federal appropriations are expected to be announced late this month.

Kansas

With approximately $18,590,000 available for the 1941 road program, Kansas highway officials expect to undertake a construction schedule totalling $7,630,000 including right-of-way. $4,580,000 has been set aside for maintenance, and other expenditures are estimated at $6,380,000.

Anticipated revenues include $2,860,000 in regular Federal Aid and $1,230,000 in other Federal funds, plus $9,750,000 from gas tax income and $4,750,000 from license fees and other state funds.

No details of the proposed construction program have been outlined as yet, but officials expect that the usual amount of each type of work will be undertaken. For 1940, construction was estimated at 180 miles of graded and drained road, 180 miles of untreated sand, clay or gravel, 150 miles of treated road, 20 miles of low-cost bituminous mix and 30 miles of high type paving.

$621,800 in previously-awarded excavation involving 4,236,000 yards will be carried over into 1941. Equipment purchase expenditures totalled approximately $216,000, and equipment rentals cost $21,400 during 1940.

Kentucky

Kentucky's 1941 highway program is still in the process of planning, but officials state that funds available should total approximately $18,000,000, or about the same as 1940 expenditures. About $10,000,000 will be spent on construction, $6,000,000 on maintenance and $2,000,000 on other department expenditures.

Regular Federal Aid funds of approximately $2,700,700 and $789,500 in other Federal funds are expected, while revenue from state funds is estimated at $13,270,000 from state gas taxes and $2,726,000 from license fees and other sources.

Tentative construction plans call for approximately 400 miles of gravel or crushed stone at an

• A Multi-Foote paver and finisher, powered by Hercules engines, at work on route 26 between Clayton and Terre Haute, Indiana.

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For your convenience in writing to Macwhyte Company, you will find a card bound in this issue.

• Welding new feet on tampers with Fleetweld electrodes at the Pacific Constructors, Inc., Shasta Dam field shop.

estimated cost of $2,500,000; 100 miles of high type paving at $4,000,000, and 200 miles of low type paving at $2,000,000, cost figures include grading. Eight major bridges are proposed, to cost a total of $1,500,000.

During 1940 the state equipment purchases totalled $371,937 and about $485,000 was spent on equipment rental.

Louisiana

Funds available for the state's 1941 program are reported at $22,031,675. A construction program estimated at $18,281,675 is planned; $3,500,000 has been set aside for maintenance and $250,000 is earmarked for equipment.

Sources of the 1941 funds are given as follows:

FUNDS AVAILABLE 1941

W. P. A.	$4,800,000
F. A. (Regular)	1,652,720
F. A. (Secondary)	215,572
F. A. (grade separation)	463,383
Flood control	5,900,000
Motor tax	7,600,000
Bond	1,400,000
Total funds	$22,031,675

Construction activity in Louisiana is graphically pictured by the following figures released by the highway commission:

COMPLETED 1940

Concrete	40	$1,829,400
Surface treatment	19	205,500
Gravel	178	1,154,900
Grading	59	1,180,300
Bridges	8	4,917,600
Grade separation	1	676,300
Roadside improvements	9	55,800
	304	$9,919,800
Maintenance construction	427	1,198,890
	731	$11,118,690

CARRIED OVER TO 1941

Concrete	54	$2,018,900
Surface treatment	18	284,000
Gravel	272	1,070,800
Grading	20	313,900
Bridges	3	1,738,000
Grade separation	1	329,800
Roadside improvements	55	713,900
	423	$6,469,300
Maintenance construction	24	66,000
	447	$6,535,300

NEW WORK 1941

Concrete	47	$2,108,000
Surface treatment	45	878,000
Gravel	356	3,141,000
Grading	33	2,572,000
Bridges	---	5,400,000
Grade separations	---	463,000
Roadside improvements	260	1,206,000
Surface treatment improvements	583	2,513,675
	1,324	$18,281,675

Principal features of the 1941 program will be the completion of the highway between the Mississippi River bridge at Baton Rouge and Nesser, including a connection with Baton Rouge; the widening of the pavement between Bonnet Carre spillway and Kenner; the paving of the highway between the Mississippi River bridge at New Orleans and Boutte; the paving of the highway between Shreveport and Caddo Lake; the paving of the relocation between Lee and Michaud and the completion of numerous flood control projects.

New work to be undertaken in 1941 will be the paving of the highway between Nesser and Prairieville and the widening of the pavement between LaPlace and the Bonnet Carre spillway on the airline highway; the paving of approximately nineteen miles on the Alexandria-Columbia highway; the widening of the pavement between Kingsville and Camp Livingston; the construction of numerous bridge and railroad grade separation structures; the construction of approximately 33 miles of concrete pavement; 45 miles of surface treatment; 356 miles of grading and surfacing; 260 miles of roadside improvement and 583 miles of improvement along concrete and bituminous highways.

Maine

Funds for Maine's forthcoming highway program are dependent upon action by the state legislature, meeting too late for publication of estimates here.

1940 expenditures included approximately $7,288,000 in construction, $3,175,000 in maintenance and $3,728,000 for other highway department expenditures. Regular Federal Aid funds of $1,901,000 and $10,000 in other Federal funds were among the sources of the 1940 financing.

Construction funds were divided for use on 43 miles of gravel or crushed stone surfacing, 271 miles of oil treatment, 16 miles of high type paving, and 30 miles of low type paving, 50 bridges were included at a cost of approximately $450,000. Already-awarded highway excavation involving 120,000 yards and costing approximately $32,000 will be carried over into 1941.

State equipment purchases amounted to approximately $66,000 in 1940.

Maryland

A five-year Maryland highway construction program costing $55,272,000 and a 20-year highway program to cost $216,947,500 were recommended December 11 to Governor O'Conor in a report of the Maryland Highway Planning Survey.

To raise additional revenue for financing the program, the report, which was based upon a four-year study of the state's highway needs, recommended increased commercial vehicle registration fees; decreased from 28 to about 21 per cent in Baltimore's share of state motor vehicle tax funds and a 50 per cent reduction in state gasoline tax refunds. These changes, together with continued federal aid and other present revenue sources, would provide

THE FIRST 10

"CATERPILLAR" DIESEL TRACTORS

...and they're still going strong!

YOU CAN EXPECT long-term, economical service from a "Caterpillar" Diesel Tractor. These first ten tell you that! Yet what they have to tell you is *only the beginning.* Because, as dependable and serviceable as these machines have been, today's "Caterpillar" Diesels are even more so!

These are not only the first Diesel tractors built by "Caterpillar" —but the *first* practical Diesel track-type tractors *ever* constructed. Each now has thousands of hours of hard work behind it . . . *and is still putting out low-cost power!* Here is evidence that the basic "Caterpillar" design and construction were *right* from the start. And while they are basically unchanged, they have been improved through these ten years of experience!

Today, for example, you get "Hi-Electro" hardening of the track roller-rims and shafts, track-pins, cylinder-liners, crankshaft, and such parts that must fight the most wear. And today's "Caterpillar" Diesel Engine gives you *more than ordinary Diesel economy* — through its ability to operate efficiently on low-priced, low-grade, non-premium fuel!

As a power-user, you owe it to yourself to know more about these first ten "Caterpillar" Diesel Tractors and others of the *tens of thousands* that have come after them. Write *today* for a FREE copy of the 32-page book entitled "1,000,000 Hours of Diesel Satisfaction."

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

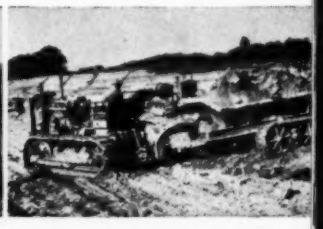
No. 1. After nine years of the heaviest kind of jobs, this "Caterpillar" Diesel Tractor is still turning in a good full day's work on the lumbering operations of Howell & Howell, Quincy, Calif.

No. 2. In 7000 hours of operation, this "Caterpillar" Diesel saved W. C. Schuder & Son, Woodland, Calif., $3750 on fuel! It is still at work and is still pulling its heavy farm loads.

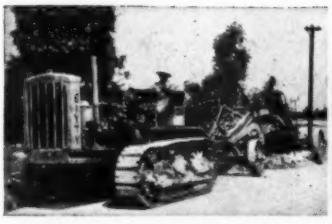
No. 3. Some of the world's heaviest pulling is found in the sugar fields. This "Caterpillar" Diesel has had 18,683 hours of it — and is still good for thousands more, according to the Oahu Sugar Company, Territory of Hawaii.

No. 4. This washing machine, on a gold-and-gravel operation near Caledonia, Va., is powered by the engine of the No. 4 "Caterpillar" Diesel. It runs 10 hours a day on 3½ gallons of fuel an hour. Operated 30,000 hours!

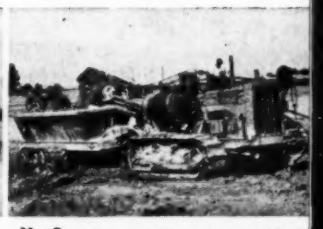
No. 5. Started out on the Mississippi levees. Its engine has since powered two cotton-gins and a lumber-planing mill. Is now powering a dragline. Has worked approximately 35,000 hours!



No. 6. A few details on this machine have been included in the brief history of the tenth "Caterpillar" Diesel Tractor, which is given below.



No. 7. More than 16,640 hours behind this seventh "Caterpillar" Diesel Tractor which went to work in December, 1931. Still building and maintaining roads for its original owner . . . the Georgia State Highway Department!



No. 8. A few details on this machine have been included in the brief history of the tenth "Caterpillar" Diesel Tractor, which is given below.

No. 9. Had five continuous years of construction work, starting in 1932. Then put on a lease basis for farming and construction — and still at it! No accurate account of its long record. E. C. Hale, Circle, Montana, owner.

No. 10. Also No. 6 and No. 8 bought by Dumon & Vandervin of Belgium, in 1931. Helped build the Albert Canal and still at work on March 30, 1940. War conditions prevent obtaining complete details of their record.

CATERPILLAR DIESEL

ENGINES AND ELECTRIC SETS • TRACK-TYPE TRACTORS • ROAD MACHINERY

sufficient revenue for the program, according to the report.

The 100-page report included a long list of engineering recommendations; asked for increased powers for the state roads commission, an increase in its engineering personnel, and adoption of many new principles of design and procedure.

Particularly emphosized was the principle that revenue should be allocated to various parts of the state highway system on the basis of need rather than tax amounts paid by city or county highway users.

Maryland's highway system was termed "obsolete for present and future traffic" because of the following defects: The existence of 6,000 sharp curves, more than 1,500 steep grades, more than 16,000 restricted sight distances, 145 railroad grade crossings and more than 400 inadequate bridges, narrow pavements — 77 per cent of the mileage being less than 20 feet wide; excessive mileage of low-type surfacing, amounting altogether to 58 per cent; deterioration of existing road surfaces; inadequate highway connections through cities, and inadequate rights of way.

It was asserted the road system also showed lack of planning, evidenced in the mileage of stub ends and unconnected roads, the over-development of 866 miles of roads with a low type surfacing, carrying heavy traffic, and many sorts of road changes and construction delays growing out of right-of-way difficulties.

Massachusetts

No estimates on the state's forthcoming program were available at press time, nor could definite figures be obtained on 1940 accomplishments.

Government reports covering the fiscal year ending October 31, 1940, however, show that as of that date the state had 26.1 miles of Federal Aid highway under construction. Federal Aid funds of $1,543,536 were involved in the estimated total cost of $3,102,023 on projects under construction.

In Federal Aid feeder or secondary roads, the state had 10.7 miles under construction, with $252,095 in Federal funds toward the total estimated cost of $508,159. One grade crossing project was under construction at an approximate cost of $336,590.

The balance of funds available for programmed Federal Aid projects was given as $2,990,700 on highways, $479,637 for secondary or feeder roads and $2,024,008 for grade crossing projects.

• Aggregate for Maryland's road; is mechanically-loaded to a state-owned 2½-yard Mack truck.

Michigan

H. C. Coons, deputy commissioner-chief engineer, reports that an estimated $11,778,500 will be available for 1941 construction, and $6,515,000 for maintenance.

Regular Federal Aid amounting to $3,014,000 plus other Federal funds of $1,174,000 and a total of $7,590,000 from state gas tax revenues are expected.

In furnishing details of the proposed construction program, Mr. Coons points out there may be changes in types of projects undertaken as the year progresses. Indications are, however, that the program will be substantially as follows:

	Miles	Amount
Grading and drainage only	12.0	$ 375,000
Surfacing-grading included:		
Gravel or crushed stone	92.3	1,544,000
Oil treatment	300.0	800,000
Paving, high type	83.2	4,519,500
Paving, low type (and grade sep.)	230.0	2,380,000
Bridges—25—cost		2,160,000

In addition, 1,740,000 yards of highway excavation previously awarded at $350,000, will be carried over into 1941.

Purchases of maintenance equipment by the state totalled approximately $250,000 during 1940. No diversion of highway funds was made as such diversion is prohibited by an amendment to the state constitution.

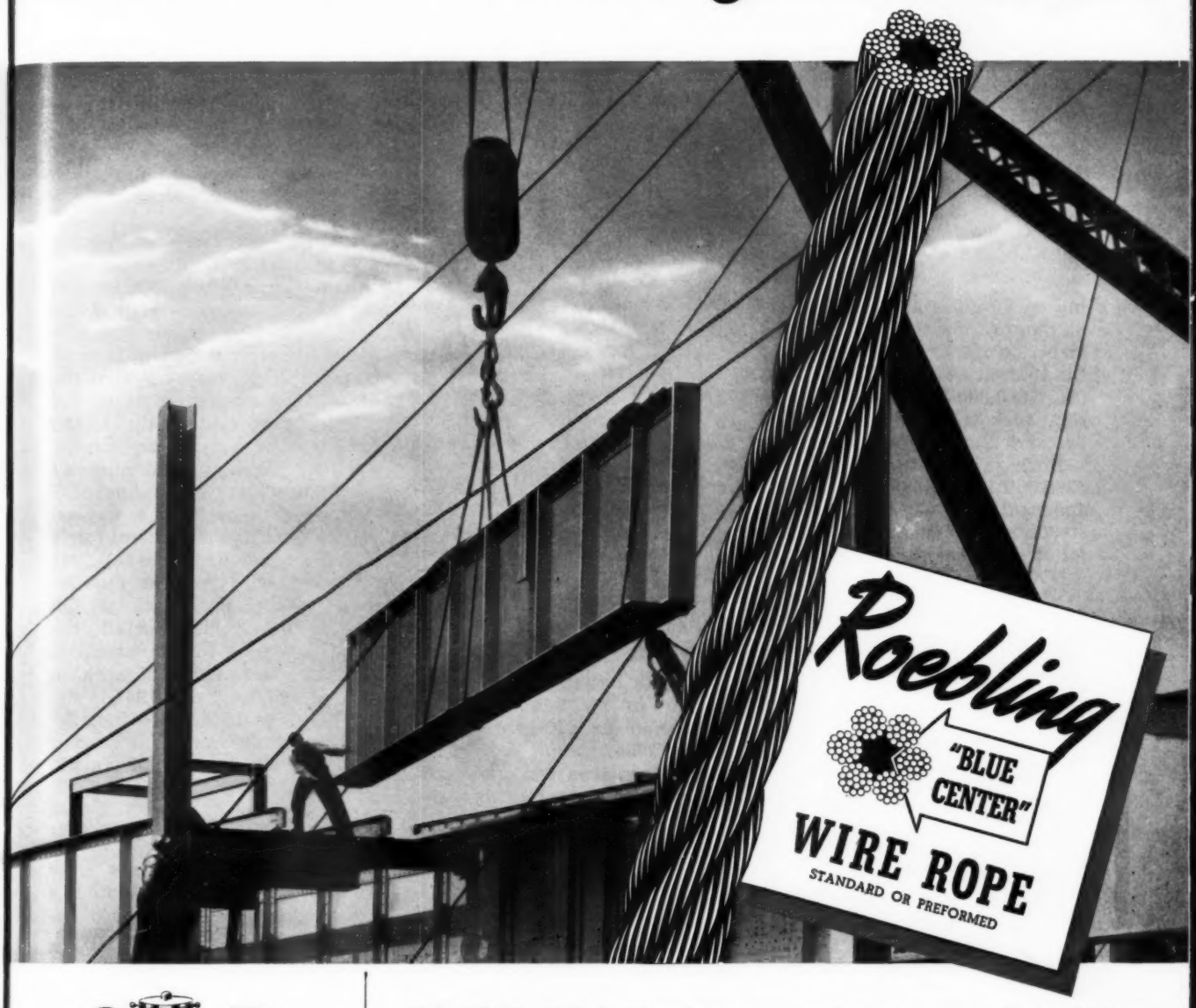
Minnesota

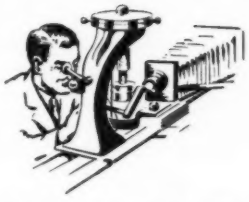
Expected funds for the state's 1941 program total $20,773,103—an increase of 13% over the 1940 expenditures. Construction is allotted $12,898,909; maintenance accounts for $6,985,772 and other highway department expenditures amounting to $888,422 make up the total.

Sources of the state's 1941 highway funds are regular Federal Aid funds in the amount of $2,697,000 plus $994,000 in other Federal funds; $9,500,000 from state gas tax revenues, and another $9,500,000 from state vehicle license fees and other income.

Included in the allotment for construction is the sum of $5,662,000 for 404 miles of grading; $1,463,000 for 190 miles of stabilized base, $2,310,000 for high type pav-

Profit from Roebling Research!





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Years of research have gone into the development of Roebling "Blue Center" Wire Rope.

Furthermore, the development and improvement of Roebling "Blue Center" is a never-ending process. A planned program of research is carried on ceaselessly in the Roebling Research Laboratory — one of America's most modern and completely equipped research units.

WHAT DOES Roebling Research mean to you? It means just this — that when you install Roebling "Blue Center" Wire Rope you can be certain that you will get in return the very last notch of service and safety which scientific rope development can assure.

When buying wire rope keep in mind that Roebling is not content to "follow the pack". Roebling's efforts to give you a rope that will assure the longest and safest service possible, means constant research—checks and investigations out in the field. It means constant laboratory research — in one of the country's most modern research units. Equally important — it means up-to-date thinking.

However, it's the service Roebling "Blue Center" Wire Rope is actually giving that's "proof of the pudding". Ask our local representative to give you the facts. Then install Roebling "Blue Center". Keep accurate service records. Compare. We are confident you will agree with others that Roebling "Blue Center" Wire Rope assures the utmost safety and lowest rope replacement cost.

JOHN A. ROEBLING'S SONS CO.
Trenton, N.J. Branches in Principal Cities

ROEBLING "BLUE CENTER" The Finest of all Roebling Wire Ropes

• Athens Township, Gentry County, Missouri, use their Allis-Chalmers tractor and leaning frame grader to build a farm-to-market road between Albany and New Hampton.

ing on 89 miles and $347,000 for 86 miles of low type paving. Construction of 27 bridges is proposed for 1941, at a total cost of $2,192,000. $680,000 in highway excavation work, awarded in 1940, will be carried over into 1941.

During 1940, the state spent $388,000 in equipment purchases and paid $110,400 rental on construction equipment, $225,000 rental on maintenance equipment.

Mississippi

R. A. Harris, chief engineer, estimates that the state's 1941 budget will total approximately $4,113,400, or about 60% under the 1940 total. Construction work will entail the expenditure of an estimated $2,313,400 and maintenance is expected to cost $1,800,000.

Anticipated 1941 revenues include $2,500,000 from regular Federal Aid, and $5,225,000 from state funds comprised of $3,000,000 from bonds and $2,225,000 from state gas tax revenues, after financing bonds.

Under the proposed construction program, an estimated 57 miles of grading requiring 1,000,000 yards of material will be undertaken, to cost approximately $1,041,000. Surfacing of all types will be undertaken on a total of 111 miles. Further construction work may be done in the state during 1941 but no definite program for this has been adopted as yet. No outstanding bridge work is contemplated for the year, but as Mr. Harris points out, a number of small bridges will doubtlessly be required on the 57 miles of grading proposed.

In addition to work reported above, a previously-awarded $400,000 in highway excavation involving 1,750,000 yards will be carried over into 1941.

State equipment purchases totalled approximately $200,000 during 1940. No highway funds were diverted.

Missouri

A tentative 1941 construction program estimated at $10,660,000 is reported for Missouri by C. W. Brown, chief engineer. Contract awards for 1940 (to December 10) and detailed estimates for 1941 are shown as follows:

1940 AWARDS TO DECEMBER 10TH

	Miles
Graded and drained (unsurfaced)	99.4
Agg-clay stabilization	28.6
Bituminous	244.7
Granular	195.9
P. C. Concrete	164.4
Total	733.0
Total contract cost (plus 10%)	$13,581,200

ESTIMATED 1941 PROGRAM

	Miles
Graded and drained (unsurfaced)	28.7
Granular	221.8
Bituminous	206.8
P. C. concrete	109.9
Total	567.2
Estimated cost	$10,660,000

During 1940, the efforts of the Missouri State Highway Commission were largely directed toward increasing road safety by modernization and improvement of the present system and the extension of farm-to-market roads as far as funds would permit, according to Mr. Brown. A continuance of these directives is planned for 1941, but all possible consideration will be given to work on those portions of the system which have been designated as military roads and strategically important to the national defense. These routes comprise approximately 2,000 miles, of which 1,142 miles have been classified in the first priority group.

It so happens that this important first priority mileage coincides generally with heavy traffic arteries that are also important for ordinary traffic service. Much of this mileage was constructed in the early days of road building and, because of more or less obsolete standards of construction and accelerated deterioration, is today, in need of serious improvement and reconstruction. It must be pointed out, however, that the demand for improvement of the remaining portion of the 15,825 miles in the system are urgent and that funds for all highway purposes are extremely limited.

Missouri is now on a pay-as-you-go basis and all Federal funds have been matched up to the 1941 allotment. Heavy bond requirements and maintenance of the system necessarily curtail the funds available for construction. An accurate estimate of work on strategic highways in 1941 is impossible, due to defense installations which are now being started and the uncertainty of future demands.

Montana

With a 7½% increase over 1940's expenditures, Montana's 1941 budget totals $8,520,000, according to a report from W. O. Kivley, highway department office engineer.

Approximately $5,700,000 of this amount will be devoted to construction; 1941 maintenance is expected to total $2,200,000 and other highway department expenditures total $620,000. Regular Federal Aid funds will provide $3,400,000 and state gas tax revenues of $5,100,000 plus $20,000 from vehicle license fees constitute the sources of the 1941 funds.

Construction funds are divided approximately as follows:

	Miles	Amount	Quantities Required
Grading	210	$2,600,000	6,000,000 Cu. Yds.
Surfacing—			Tons
Gravel or crushed stone	225	1,560,000	1,600,000

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The extra pay load of every cycle gives you extra profits on every job. Get a Red Arch dragline bucket *(equipped with the new Red Arch chain)* and convince yourself that these buckets are better shaped to dig faster, are lighter to save more of your power for dirt-moving, are better balanced to carry higher heaps, are smoother flared and unobstructed to dump faster, and are strong and sturdy to stand up with less time-out. Try Red Arch. You save on maintenance and increase output — *that means more profit for you!*

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			Gallons
Oil treatment	140	600,000	3,500,000
Paving, high type	1	140,000	
Bridges—100—cost		800,000	

In addition to the above, a 1940 award of $440,000 in highway excavation work involving 2,450,000 yards will be carried over into 1941. During 1940, the state spent $264,000 to purchase equipment and paid approximately $15,000 in equipment rental, Mr. Kivley reports.

No diversion of highway funds was made in Montana during 1940.

Nebraska

A. C. Tilley, state engineer, estimates that approximately $9,000,000 will be available for the state's 1941 program. This includes $5,665,000 for construction, $3,000,000 for maintenance and $335,000 for other expenditures.

Sources of the above funds are approximately as follows:

Federal Funds—	
Regular Federal Aid	$1,927,500
Other Federal Funds	522,500
State Funds—	
State gas tax	5,850,000
License fees and other income	700,000
Total	$9,000,000

Details of the proposed $5,665,000 construction program are not as yet available. Some 4,700,000 yards of highway excavation awarded in 1940 will be carried over, however. During 1940, the state spent approximately $250,000 on equipment purchases, Mr. Tilley reports.

Nevada

H. D. Mills, assistant state highway engineer, reports that $3,842,000 is expected to be available for Nevada's 1941 program. Of this amount, $2,417,000 is proposed for construction, $875,000 for maintenance, and $550,000 for other highway department expenditures.

In addition, 582,000 cu. yds. of roadway excavation amounting to $61,350 awarded in 1940 will be carried over into 1941. Proposed road construction for 1941 includes the following:

Reconstruction (plantmix asph. surf.)—	
76.24 miles, est. cost	$1,430,000.00
New Constr. (roadmix asph. surf.)—	
47.21 miles, est. cost	285,000.00
New Constr. (gravel surf.)—	
46.68 miles, est. cost	250,000.00
Grade Crossing Protection	97,000.00

Regular Federal Aid funds will account for $1,917,000 of the 1941 funds while state gas tax revenues will furnish $1,475,000, and an additional $450,000 is expected from vehicle license fees.

Mr. Mills reports that Nevada's most outstanding project for 1941 will be the reconstruction of approximately 7 miles of highway on US 40 over Immigrant Summit in Eureka County. Practically the entire 7 miles will be constructed on new alignment, eliminating existing sharp curves, both horizontal and vertical, maximum 6% grade, compensated. Roadway width will be 30 feet with 24-foot width of plant mix asphaltic surface. At approximately two mile intervals the shoulders will be widened to 10 feet in accordance with recommendation of the War Department for all highways on the strategic network. It is estimated there will be approximately 800,000 cu. yds. of excavation, 50% in rock. Estimated cost, $315,000.

● To facilitate the moving of the Central Square Garage in Youngstown, Ohio, a Bucyrus-Erie 10-B dragshovel owned by the G. F. Howard Construction Company, does some foundation excavation work. Over 1,000 yards of dirt were dug to free the building's foundations.

New Hampshire

Frederic E. Everett, commissioner, reports that an estimated $6,756,000 will be available for New Hampshire's 1941 program. This sum, which is about the same as last year's expenditures, will be assigned as follows: construction $1,911,000; maintenance $3,380,000; and other work $1,465,000.

Regular Federal Aid amounting to $560,625, and state funds composed of $2,700,000 in gas tax revenues and $2,850,000 in license fees and other income, will cover the 1941 program cost.

Construction plans for the coming year call for 10 miles of gravel or crushed stone surfacing at an estimated cost of $80,000; 50 miles of oil treatment at $600,000, 20 miles of high type paving costing $700,000, and 30 bridges to cost $300,000.

During the past year the state equipment purchases totalled approximately $9,000 and equipment rental amounted to $125,000. No diversion of highway funds during 1940 was reported.

New Jersey

No forecast is available at this time from highway officials as determination of funds available for highway construction awaits action by the New Jersey Legislature, which meets this month.

Government reports issued as of October 31, 1940, however, are available to indicate the status of Federal Aid work in the state. At that time, New Jersey had 32.9 miles of Federal Aid highway under construction to cost approximately $4,595,830. An additional 5.5 miles at an estimated total cost of $1,047,230 was approved for construction and there was a balance of $1,610,075 in funds available for programmed projects.

Federal Aid secondary or feed-

World's Longest Belt Conveyor Uses 83,000 TIMKEN Bearings

TRADE-MARK REG. U. S. PAT. OFF.

THE necessity of moving over 10,000,000 tons of sand and gravel a distance of 9½ miles on the Shasta Dam project resulted in the construction of the world's longest belt conveyor.

In this conveyor, 20 miles of 36" belt travel on 16,000 Rex troughing and return belt idlers containing approximately 83,000 TIMKEN Tapered Roller Bearings. Twenty-three 200 H.P. motors furnish the motive power, producing a belt speed of 550 feet per minute. The conveyor transports 1,100 tons of material per hour and a complete trip is made in 1 hour and 40 minutes. Even at this speed and operating day and night, 4 years will be required to move the total tonnage of material.

Operating between the towns of Redding and Coram, California, the conveyor crosses the Sacramento River at two points, passes over a state highway, five county roads, four creeks and the main line of the Southern Pacific Railroad.

Additional statistics. In manufacturing the 16,000 belt idlers the Chain Belt Company used 18 miles of steel tubing, 11 miles of steel shafting, 10½ miles of angle iron, over 50,000 malleable castings and as already stated, 83,000 TIMKEN Bearings.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

Tapered Roller TIMKEN BEARING EQUIPPED

TIMKEN
TAPERED ROLLER BEARINGS

For your convenience in writing to The Timken Roller Bearing Co., you will find a card bound in this issue.

● Mounted on a T-40 TracTractor, this Bucyrus-Erie Bullgrader is busy cutting and filling around a concrete culvert on the Natchez Trace, 455 mile scenic route between Natchez, Mississippi and Nashville, Tennessee.

er-road projects under construction totalled 11.4 miles at an estimated $318,057; 6 grade crossing projects were under construction to cost $792,763, with 4 other projects approved for construction at a total estimated cost of $73,220.

An indication of possible future highway construction is given in a news item released late in December, stating that construction and operation of a system of toll-financed parkways in New Jersey will be considered by the 1941 state legislature. A resolution was adopted by the house on December 9 creating a five-member committee to study the feasibility of such action.

New Mexico

Approximately $9,100,000 will be available for New Mexico's 1941 program, according to preliminary estimates. $6,000,000 of this is intended for construction, while maintenance is expected to take $1,500,000 and $1,600,000 has been budgeted for other highway department expenditures.

Regular Federal Aid funds totalling approximately $1,063,000 plus grade crossing and secondary Federal funds of $447,000 will help finance the program. Income from state gas tax revenues is estimated at $4,642,000 including debt service, and license fees are expected to total $665,000.

No forecast as to the nature and type of improvement to be made under the state's $6,000,000 1941 construction program was possible at press time, due to uncertainty as to just how Federal Aid will be expended. Carry-over of previous awards totalling $479,326 on 2,550,560 yards of highway excavation into 1941 is reported.

During 1940 the estate equipment purchases amounted to approximately $450,000 and about $500,000 was spent on equipment rental. No diversion of highway funds took place during the past year.

New York

Appropriations for the state's 1941 highway program await action by the state legislature which does not convene until late this month.

Some indication of highway activity may be gained, however, by the fact that at the end of October, 1940, the state had 55.6 miles of Federal Aid secondary or feeder roads under construction at an estimated cost of $2,202,315. Approved for construction was an additional 7 miles at $118,500.

Federal Aid highway projects reported under construction at that time totalled 224.4 miles estimated at $16,837,591; highway projects approved for construction involved 31.2 miles at $2,248,227.

On November 20, 1940, the State Public Service Commission announced a grade crossing elimination program consisting of 32 new projects involving 60 crossings to cost an estimated $11,191,500. Listed as carried over from 1940 are 34 projects covering 88 crossings at a total of approximately $42,396,500.

North Carolina

With an expected $25,200,000 available for 1941, North Carolina places a construction program estimated at $9,700,000. This leaves a total of $15,500,000 for maintenance and other highway department expenditures.

Regular Federal Aid funds of approximately $4,100,000 plus $21,100,000 from state gas tax, license fees and other funds, will finance the program.

Preliminary figures indicate that the 1941 construction funds will be divided for use as follows:

	Miles	Amount
Grading	90	$1,100,000
Surfacing and grading—		
Gravel or crushed stone	215	2,900,000
Paving, high type (including widening)	210	3,150,000
Paving, low type (including widening)	35	400,000
Bridges and culverts—40—cost		2,150,000

State equipment purchases during 1940 are reported at approximately $700,000.

North Dakota

Included in funds expected to be available for North Dakota's 1941 highway expenditures is an estimated $3,060,000 for construction, a total of $1,636,000 for maintenance and the sum of $514,000 for other expenditures.

Regular Federal Aid amounting to $3,000,000 together with $2,470,000 in state gas tax funds and $715,000 from license fees and other income, will finance the program.

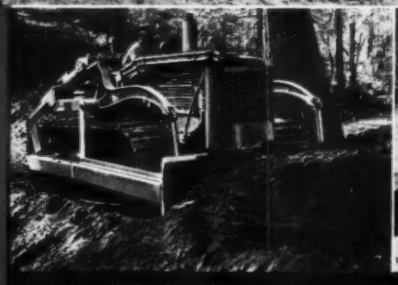
Included in the proposed construction work is 180 miles of surfacing involving 7,000,000 yards;

(Continued on page 60)

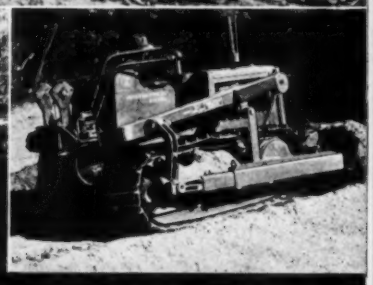
Bullgraders and bulldozers—several models International Tractractors—2-wheel scrapers in sizes from 2½ yards to 7 yards struck measure

WITH the largest construction volume in eleven years indicated for 1941, you're going to need equipment that really produces and keeps going under pressure. With the defense program under full swing, the heat is on. There'll be plenty of work for you, but to make money on it, big money, you'll need equipment that can stand the gaff!

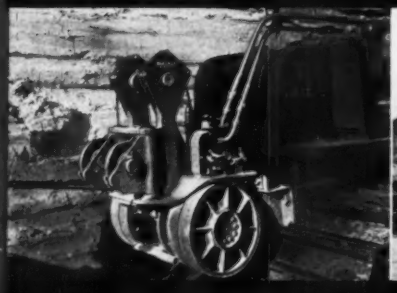
More than sixty years in the dirt-moving game have given Bucyrus-Erie the experience, knowledge, and skill to produce the best there is in materials, design, and workmanship. That's why, when you buy Bucyrus-Erie tractor equipment, you get the toughest, most productive units on the market. And those are the kind of units you're going to **have** to use to make 1941 the big-profit year it should be.



Hydraulic Bullgraders

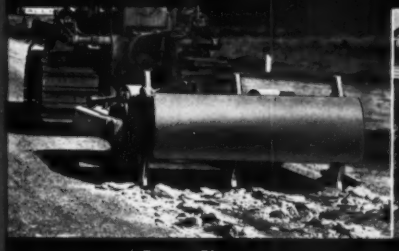


Cable Bullgraders and Bulldozers



Power Control Units

Cable Rippers



Rotary Rippers

Tractor Cabs

Tamping Rollers

2½-yd. Back-Dump Scrapers

Bucyrus-Erie Company

SOUTH MILWAUKEE • WISCONSIN • U. S. A.

(*Continued from page 56*)

1,080,000 tons of crushed stone base; 67 miles of oil treatment surfacing and 180 miles of low type paving. One bridge, estimated to cost $70,000, is also included in the program. Carry-over of 3,000,000 yards of highway excavation at a previously-awarded price of $330,000 is reported in addition to the above.

Equipment purchases during 1940 amounted to approximately $75,000. No diversion of highway funds was reported.

Ohio

Although formulation of Ohio's plans for 1941 is not yet complete, officials estimate that approximately $19,000,000 is available for construction plus an additional $11,000,000 for maintenance.

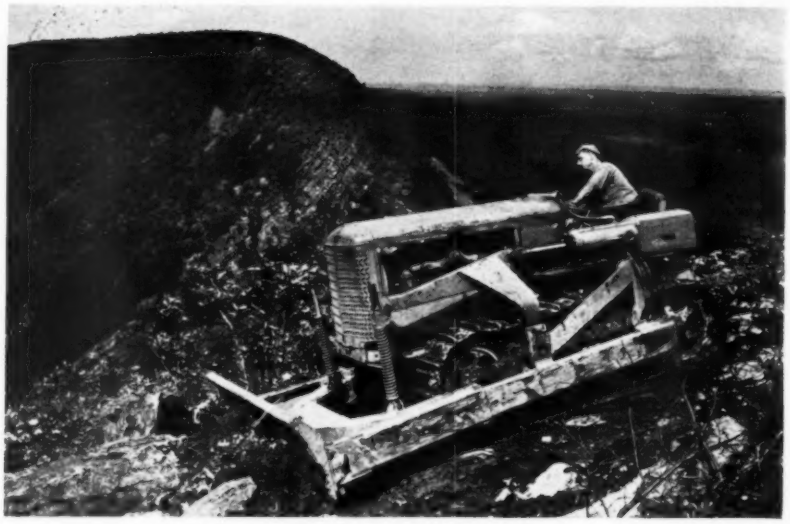
Sources of the 1941 funds are shown below with approximate amounts expected:

Federal Funds—	
All Regular Federal Aid	$9,750,000
Other	1,000,000
State Funds—	
Construction Fund	8,250,000
Maintenance Fund	6,500,000
Maintenance Fund	4,500,000

Included in the proposed $19,000,000 construction program are 10 miles of gravel or crushed stone surfacing at an estimated cost of $100,000; 300 miles of high type paving at $12,900,000, and 50 miles of low type paving at $1,000,000. Grading is included in the paving contracts. Eighty bridges and railroad grade separations are planned, to cost a total of approximately $5,000,000. In addition, contracts totalling $1,300,000 awarded previously on 2,700,000 yards of highway excavation, will be carried over into 1941.

During 1940 the state spent about $650,000 in equipment purchases and $100,000 in rental costs. There was no diversion of highway funds during the year.

A record was established for the state with a total of $21,187,352 in new highway construction completed or put under contract during the first eleven months of 1940. This is the largest sum ever expended or encumbered for road building in the history of the state.



• Perched high atop a Pennsylvania mountain top, this Cletrac-mounted Heil 'dozer is working on the Rim Road WPA project in Delaware Water Gap, Pennsylvania.

• The self-levelizing, underbody grader on this 3½-yard FWD truck makes this unit useful the year 'round on county roadwork in Tuscarawas County, New Philadelphia, Ohio.

Oklahoma

Oklahoma's 1941 program is still being planned, but preliminary figures indicate that about $17,000,000 will be available, of which approximately $12,500,000 will be devoted to construction with the balance set aside for equipment, maintenance, and administration.

Included in the sources of expected 1941 funds are $3,382,000 in regular Federal Aid funds and $13,618,000 from state funds.

No details of proposed construction are obtainable at this time. Some indication of construction activity is given, however, by the report showing the status of Federal Aid construction as of October 31, 1940. At this time, Oklahoma had 10 grade crossing eliminations under construction at an estimated cost of $591,587 with an additional $205,628 in work approved for construction. Federal Aid highway projects under construction at that time involved 106.3 miles at an estimated cost of $3,340,533 and 42.6 miles were approved for construction at ap-

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proximately $1,063,885. In Federal Aid secondary or feeder road projects, Oklahoma had 13.3 miles under construction at $209,265 and 3.1 miles approved to cost about $92,880.

Oregon

Approximately $17,500,000 is expected to be made available for Oregon highway purposes for 1941, which represents a gain of 9% over the 1940 allotments. $7,750,000 of the above will be devoted to construction, $3,935,000 to maintenance and $5,815,000 will be available for all other highway department expenditures.

Federal funds will provide $3,600,000 of the budget, with $2,600,000 of that figure representing regular Federal Aid. State gas tax collections will provide $11,570,000 and vehicle license fees will net $1,400,000 after deducting $2,410,000 for counties and $350,000 for state police. No diversion of highway funds was reported for Oregon in 1940.

1941 construction funds will be divided for use approximately as follows, carry-over amounts from 1940 being included:

	Miles	Amount	Quantities Required
Grading	280	$3,000,000	5,500,000 Cu. Yds.
Surfacing—			
Gravel or crushed stone	450	1,700,000	2,200,000 Tons
Oil treatment	550	950,000	23,000 Sq. Yds.
Paving, high type	35	900,000	450,000 Sq. Yds.
Paving, low type	40	400,000	550,000 Sq. Yds.
Bridges—18—cost		800,000	4,300 Lin. Ft.

During 1940, the state spent approximately $330,000 for equipment purchases and had no equipment rental cost.

Pennsylvania

With the now-famous Turnpike in operation, Pennsylvania's officials are making plans for further developing the state's highway system. Except for the status of Federal Aid projects, however, no details have yet been announced on the 1941 program.

$2,694,778 in Federal Aid funds were earmarked for use on projects approved for construction (as of October 31, 1940) whose estimated cost totalled $4,092,584. This included $2,636,166 for 25.8 miles of Federal Aid highway, $128,000 for 1.9 miles of secondary or feeder road and $1,328,418 for 11 grade crossing projects.

Rhode Island

Up 15% from 1940 expenditures, Rhode Island's expected available funds for 1941 total $3,100,000. Of this amount, approximately $1,700,000 will be devoted to construction and $1,400,000 to maintenance. $2,320,000 of this amount will be derived from state funds, and $780,000 from regular Federal Aid.

Construction work in 1941 is forecast as follows:

	Miles	Amount	Quantities Required
Grading	15	$ 502,758	760,642 Cu. Yds.
Surfacing—gravel or crushed stone	15	172,669	58,881 Tons
Oil treatment	15	55,723	345,297 Gallons
Paving, high type	15	944,700	371,553 Sq. Yds.
Bridges—8—cost		279,383	

$34,022.09 for 110,434 yards of highway excavation work awarded previously will be carried over into 1941.

During 1940, expenditures for equipment purchases totalled approximately $150,000. No equipment rental costs are reported.

South Carolina

The road building program of South Carolina's state highway department proceeded at about the same pace in 1940 that it did during previous years. During the calendar year construction contracts were awarded for projects aggregating $8,512,000 in cost. Actual construction expenditures in 1940 amounted to approximately $7,950,000.

The state highway system in South Carolina comprises about 9,640 miles, of which about 6,550 miles are now hard surfaced. During the past three years the state legislature has added 3,000 miles to the state system, or about the same mileage of the roads now in the system which are not hard surfaced. This 3,000 miles of new roads was added at the rate of 1,000 miles a year during 1938, 1939 and 1940.

Classification of the miles on the state highway system by types, as of October 31, 1940, is as

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Mountable on any truck
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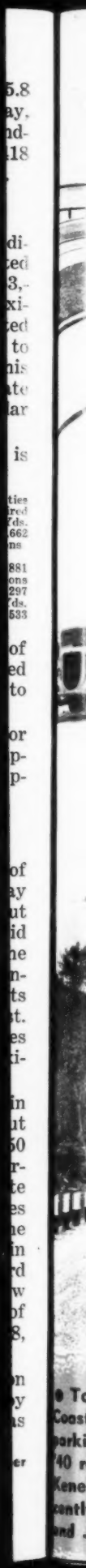

● Top (below): A "riflebarrel" section of Nevada's U. S. 395 in the western part of the state. Center: Cutting through hills instead of going around them, Nebraska relocates a highway near Fort Robinson. Bottom: Scenic section of Washington's primary state highway No. 3 between Nancy Creek and Deadman Creek.

● Top (above): Mississippi's U. S. 90 along the Gulf Coast offers a divided 4-lane highway and convenient parking areas to motorists. Center: Texas' outstanding 1940 road project was a 48.8-mile soil-cement road in Kenedy County. Bottom: A section of Vermont's recently completed state route 15 between Johnson and Jeffersonville.

follows:

Type	Miles	
Completed:		
Standard high type pavements	2,611.45	
Bituminous surface treatments	3,828.10	
Earth types	150.99	
		6,590.54
Under Construction:		
Standard high type pavements	9.17	
Bituminous surface treatments	161.94	
Earth types	111.00	
		282.11
Unimproved		2,769.77
Total Miles		9,642.42

The highway department is in a sound financial condition as reflected by the price its bonds sold for this year. Two issues, serial bonds, were offered, and sold at the following rates:

May 1, 1940	$2,000,000	1½%
Nov. 1, 1940	$3,000,000	1½%

The department has a construction expenditure investment of about $150,000,000 (as of June 30, 1939) in the state highway system with a bonded indebtedness of $62,912,534.71 (as of June 30, 1940).

The revenue of the department for the fiscal year ending June 30, 1940, from the gasoline tax and the motor vehicle license fees was:

Gasoline tax (5c)	$10,654,000.87
Motor vehicle license fees	1,650,344.99
Total	$12,304,345.86

During the year the State Supreme Court held invalid for the second time in the past two years acts of the legislature to divert portions of the gasoline tax and motor vehicle license fees. The last opinion handed down by the court this past fall apparently settled the question of diversion for the future.

• Excavation for an overhead crossing on Wisconsin's U. S. 41 is handled by a Lima shovel loading to an 8-yard Four Wheel Drive truck. Wm. Lather, Jr., Construction Company held the contract.

Maintenance expenditures for the fiscal year ending June 30, 1940, were as follows:

Direct cost of maintenance	$1,652,892.84
Retreatment	700,351.25
Shoulder treatment	481,663.10
Special maintenance	1,965.99
Purchase of new equipment	520,178.40
Total	$3,357,051.58

It is anticipated that expenditures for construction and maintenance operations in 1941 will be about the same level as 1940.

South Dakota

Thor Soleglad, assistant highway engineer, lists approximately $7,645,000 in expected funds available for the 1941 program, which represents an increase of approximately 3% over the 1940 expenditures.

Construction work in 1941 is expected to total $3,420,000, plus $1,225,000 in work awarded during 1939 carried over. $2,150,000 will be devoted to maintenance, and other highway department expenditures are expected to total $350,000.

Regular Federal Aid funds will make available approximately $2,545,000, plus other Federal funds amounting to $525,000. State gas tax revenues totaling $3,750,000 and $825,000 from license fees and other income provide the balance.

1941 construction funds will be

Sauerman LONG RANGE MACHINES

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Here's another small SAUERMAN Scraper that moves sand from hill to asphalt plant at cost of 4 cents per cubic yard.

This shows a typical SAUERMAN Scraper layout for storing and reclaiming large tonnage of coal, or any bulk material.

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FEDERAL AID GRADE CROSSING PROJECTS

AS OF OCTOBER 31, 1940

STATE	COMPLETED DURING CURRENT FISCAL YEAR					UNDER CONSTRUCTION					APPROVED FOR CONSTRUCTION					BALANCE OF FUNDS AVAILABLE FOR PROGRAMMED PROJECTS
			NUMBER					NUMBER					NUMBER			
	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	Estimated Total Cost	Federal Aid	Grade Crossings Eliminated by Separation or Relocation	Grade Crossing Structures Reconstructed	Grade Crossings Protected by Signals or Otherwise	
Alabama	$ 4,100	$ 4,100			1	$ 720,404	$ 700,327	6		1	$ 47,539	$ 47,539	1	1	7	$ 916,112
Arizona	192,342	184,976	3			179,037	178,688	1			6,006	6,006			2	242,091
Arkansas	85,999	85,999	1		6	1,245,833	1,241,467	12	1	1	144,553	144,553	1		9	332,818
California	238,449	238,449	3		3	828,771	650,291	2	1		507,007	505,045	6		12	1,227,650
Colorado						283,222	283,222	1			3,401	3,401			1	921,104
Connecticut	270,224	264,463	1	1		517,556	512,317	6								449,334
Delaware	65,760	65,760			12	117,498	117,498	1		4	13,839	13,839	4		1	467,605
Florida	207,524	203,025	2		2	37,626	37,626	1			194,523	193,998		1	25	1,220,136
Georgia	100,753	100,658	2		12	895,795	895,795	11	5		531,974	531,974	2	4	6	1,735,588
Idaho	206,100	202,670	5		2	8,830	8,830			1	89,237	89,237			31	413,990
Illinois	600,672	547,061	4	1	23	2,294,881	2,084,758	9	1	49	215,158	184,666			77	1,975,749
Indiana	262,468	262,468	1	1	35	877,185	877,185	6	1	38	87,075	87,075			27	991,923
Iowa	292,444	239,250	3		42	312,391	275,233	3		39	64,788	61,696			19	1,205,976
Kansas	563,185	563,185	8		11	409,294	408,816	4	1	3	122,900	122,900	3	1	11	1,157,399
Kentucky	170,478	169,935	4		11	1,037,019	1,037,019	11			35,400	35,400	1		3	549,281
Louisiana	95,496	95,496	1			345,122	291,627	2			627,884	570,153	11			804,609
Maine	157,399	156,481	1	1	5	21,934	21,934		1	1	125,990	125,990	1			251,016
Maryland	180,997	180,993	1		2	476,609	444,816	2	2	5	15,600	15,600			3	767,315
Massachusetts	15,710	15,710				336,590	326,168	1			1,034	1,034			1	2,024,008
Michigan	941,190	907,876	7	1	18	1,418,695	1,418,695	3	4	5	104,950	104,950		1	18	743,016
Minnesota	766,380	758,524	8	1	6	1,254,907	1,254,907	8	4	8	213,272	213,272	1	2	6	1,009,406
Mississippi	23,760	23,760				628,634	628,634	9	1		275,000	275,000	3		3	503,012
Missouri	541,321	541,321	1	2	1	1,455,654	1,167,274	6	3		1,055,014	826,484	4	2		973,697
Montana	427,675	427,675	5		2	82,097	82,096	1			9,155	9,155			3	350,584
Nebraska	204,949	204,949		1	7	741,392	741,392	11	1	3	302,249	302,249	5		1	265,549
Nevada	11,144	11,144			7	125,527	125,527	2		6	21,199	21,199			12	115,071
New Hampshire	100,959	100,953	3			149,458	148,638	3		1						325,194
New Jersey	140,504	140,504	1		6	792,763	792,763	5		1	73,220	73,220		1	3	1,189,123
New Mexico						304,092	274,896	4								482,206
New York	428,630	427,120	3	1		3,786,319	3,718,553	9	19		241,245	240,245		1	8	2,831,215
North Carolina	164,092	164,089	1	1	13	989,429	989,189	13	5		95,530	95,530			27	818,777
North Dakota	448,315	448,150	5		15	404,220	404,220	4		6	5,700	5,700			2	528,663
Ohio	369,098	347,336	4		2	2,462,415	2,413,225	10	3	13	818,157	790,393	4		2	2,235,007
Oklahoma	253,288	252,261	2	1	24	591,587	590,240	10		1	205,628	202,212	1		43	1,880,962
Oregon	208,639	117,537	3			254,208	197,981	1			5,790	5,790			2	357,935
Pennsylvania	618,267	618,267	8	1		1,878,155	1,868,351	13	1		1,328,418	1,324,918	9	2		3,077,356
Rhode Island	3,831	3,750				192,501	192,501		1							94,451
South Carolina	325,148	325,148	4	2	7	184,294	183,891	1	1	12	162,832	162,832			31	916,503
South Dakota	72,600	72,600	1	1	2	282,902	282,042	7		2	462,535	446,585	10			739,692
Tennessee	204,265	204,265	1	2		173,264	173,264	1	1		34,462	34,462		1		1,715,788
Texas	1,145,408	1,140,600	10		3	1,181,428	1,171,063	10	1	6	77,700	77,700	1		2	1,998,980
Utah	12,419	12,208			3	37,963	37,963			10	108,747	108,640	2		40	246,680
Vermont	5,995	5,995			2	218,520	218,520		2	4	25,623	25,623			4	220,367
Virginia	81,101	80,765	1	2	3	691,669	690,339	6		2	140,842	140,842		2	10	593,601
Washington	242,856	242,856	3	1	5	123,070	121,570	1	1		198,172	198,168	1	2	7	390,610
West Virginia	5,400	5,400			2	229,982	229,982	2			66,670	64,580	2		1	1,079,957
Wisconsin	815,489	799,460	6	3	7	470,132	441,102	3	1	3	17,167	17,167			5	1,365,384
Wyoming						540,923	540,923	5			22,085	22,085	1			171,492
District of Columbia						59,061	59,061	1								150,009
Hawaii						194,036	194,028	2			9,494	9,494			2	292,509
Puerto Rico						584,007	579,336	11								414,857
TOTALS	12,272,853	11,965,132	117	24	302	33,428,901	32,325,783	241	62	225	8,917,765	8,538,601	74	21	467	45,731,357

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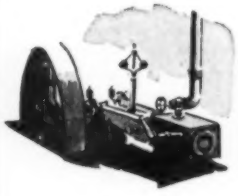
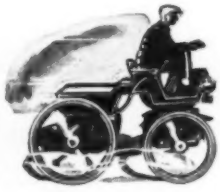
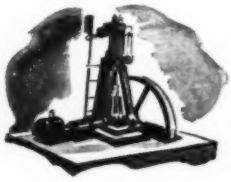


1876—
600-W FOR
STEAM ENGINES



1877—
OIL FOR MR.
SELDEN'S AUTO

1896—VELOCITE
OILS FOR HIGH-
SPEED SPINDLES



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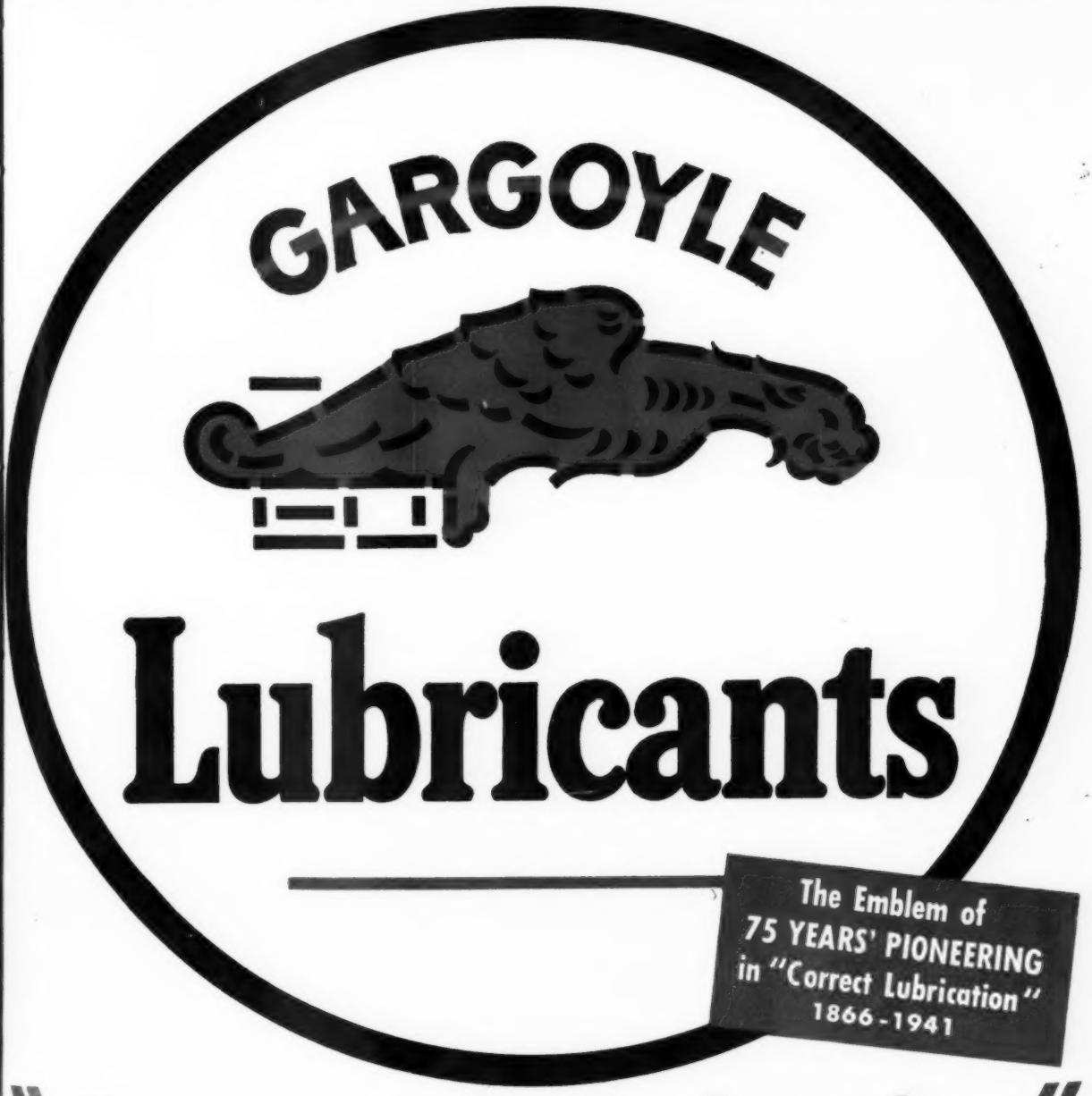

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• Pavement breaking jobs are speeded up with the aid of this Thor paving breaker, manufactured by the Independent Pneumatic Tool Company.

divided approximately as follows:

	Miles	Amount	Quantities Required
Grading	215	$1,030,000	9,000,000 Yards
Surfacing—			
Gravel or crushed stone. Bit. treated base courses	260	1,300,000	1,076,000 Tons
Oil Mats	100	490,000	
Paving, high type	8	225,000	
Bridges—35—cost		375,000	

During 1940, the state's equipment purchases amounted to approximately $50,000, and no equipment rental costs were reported.

Tennessee

A total possible construction program of $9,626,426, including state and Federal funds, is forecast for Tennessee in 1941.

As of December 1, 1940, the Department of Highways had programmed mileage and funds on Regular Federal Aid projects financed by state and Federal funds as follows:

51.4 miles of grading and drainage at an estimated cost of $1,118,688.00.
17.7 miles of paving at an estimated cost of $870,000.00.
10.6 miles of surfacing at an estimated cost of $250,236.00.
4 bridge projects estimated at a cost of $450.000.

The 1941 regular Federal Aid program, as submitted, involves a total expenditure of $4,783,516.00.

Tennessee's 1941 grade crossing program consists of four overheads at an estimated cost of $225,000.00, and four underpasses at an estimated cost of $326,110.00.

In 1940, the grade crossing program consisted of five overhead structures at an estimated cost of $270,000.00, and one relocation elimination at a cost of $85,000.00, being 4.4 miles in length.

Programs being prepared include 1940 secondary funds $623,940.00 and $623,936.00 of 1941 secondary funds; the above amounts include state and Federal funds.

Reconstruction costs on War Department priority mileage in Tennessee are estimated by officials to total approximately $38,108,900.00.

The strategic highway mileage in Tennessee consists of 982 miles of first priority, 47.7 miles of second priority, and 60.5 miles of alternate mileage. To bring this mileage to a standard considered adequate for the safe and speedy movement of war equipment, the following estimated improvements would of necessity be required.

Approximately 688 miles of roadway widened by grading and drainage at an estimated cost of $10,803,900. Of this, 278 miles would have to be reconstructed, requiring grading and drainage at an estimated cost of $7,951,400. Twelve miles of surface widened at an estimated cost of $123,500 and 289.6 miles of surface reconstructed at an estimated cost of $8,445,700. Included in these plans are 26 bridges with span length less than 85 feet, which would have to be replaced at an estimated cost of $1,203,700, and 10 over 85 feet span length, at an approximate cost of $9,125,000. Three underpasses reconstructed at a cost of $180,000 and seven overheads at an estimated cost of $414,200.

Texas

Construction to be placed under contract in 1941 will total approximately $36,000,000, according to tentative figures submitted by officials of the Texas highway department.

At the close of the fiscal year ending August 31, 1940, the department announced the following receipts for the year:

DREDGING
proves it
Any clamshell that will dig under water as the Haiss Hi-Power does 's got what it takes. You can make money with one on ANY job. Write or wire for prices. All sizes.
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FOR PAY LOAD CLAMSHELL DIGGING

In stock at New York, Philadelphia, Baltimore, Atlanta, Hartford and Los Angeles.
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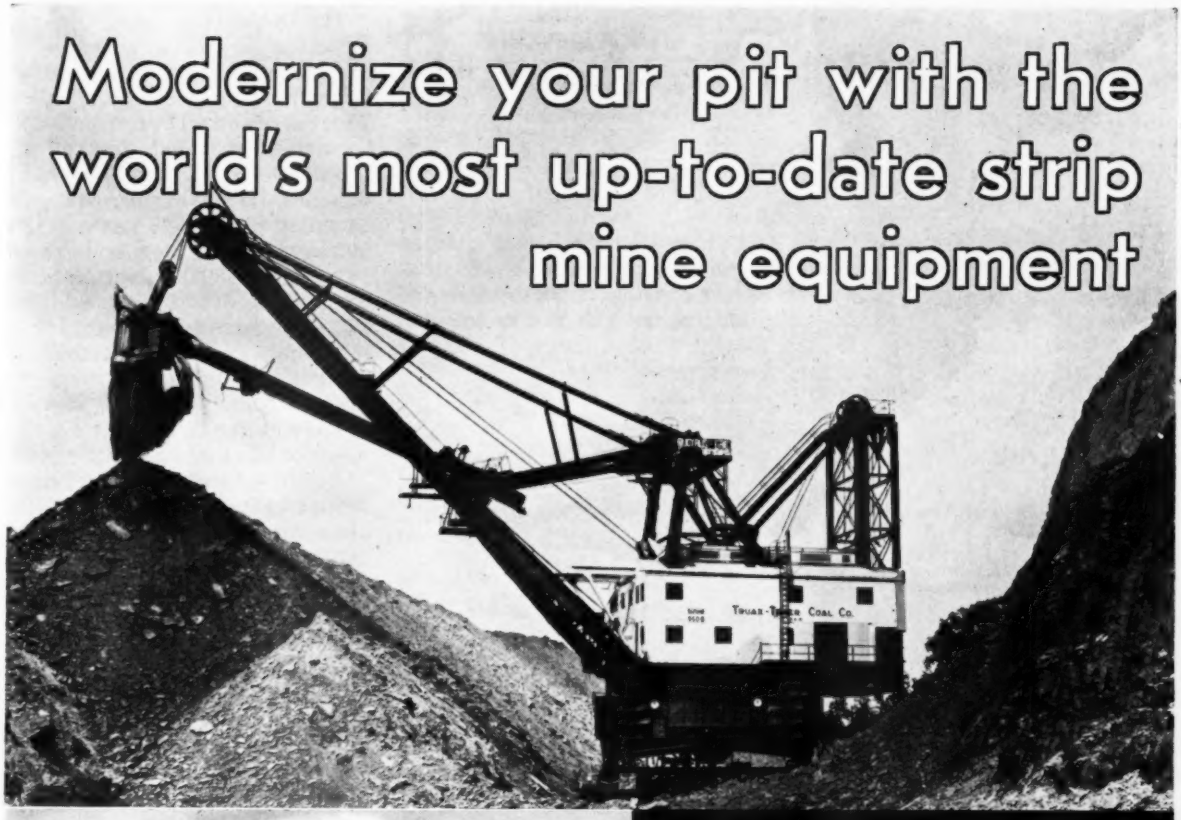
Modernize your pit with the world's most up-to-date strip mine equipment



Over a hundred experienced engineers work the year 'round through good times and bad, keeping Bucyrus-Erie designs up-to-date. They utilize all the information constantly flowing into an organization such as ours — on-the-job information from our sales-engineers, analyses of parts orders, copies of correspondence, the suggestions and comments coal-men send in from all over the world. These designing engineers visit your operations and talk with you, your master mechanic and your operators, they apply the mechanical improvements and developments accumulated from other digging industries, from quarry, metal-mine, contractor, brick and clay, logger, dredger, railroad and industrial plant.

Thus each machine is improved over those that have gone before — perhaps only a small part here or there — but each represents the best engineering in the field — the most complete and up-to-date knowledge of the coal industry.

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SOUTH MILWAUKEE, WISCONSIN

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Net license fees		$ 8,492,312.73
Gasoline tax		22,775,446.81
Depository interest on state highway fund		17,307.40
Office and sundry		232,301.88
Advance deposits on consruction—PWA		253,720.45
Reimbursements on construction—		
Federal funds — state highway fund	$11,466,030.22	
County funds	25,401.60	
Other funds	15,462.23	
		$11,506,894.05

During the fiscal year covered by the above figures, a $28,020,989.29 construction program was placed under contract as follows:

Type	Mileage	Cost
Grading & small structures	283	$ 2,433,308.86
Gravel, caliche, etc. surface	631	5,568,264.69
Asphalt surface	1,480	11,217,667.66
Concrete	158	4,842,979.70
Highway protecting devices		59,500.00
Highway planning survey		260,400.00
Landscape projects		151,300.00
Total highways	2,552	$24,533,420.91
Large bridges		$ 1,793,754.58
Underpasses & Overpasses		1,693,813.80
		$ 3,487,568.38
		$28,020,989.29

An interesting record of average per-mile maintenance costs, reflecting the consistent decrease in maintenance costs as higher type roads have been completed within the state, appears below as furnished by E. J. Amey administrative assistant:

Year Ending August 31	Average Per Mile
1931	$355.13
1932	340.32
1933	302.90
1934	295.54
1935	340.35
1936	354.18
1937	321.29
1938	314.14
1939	289.92
1940	294.17

Utah

Ezra C. Knowlton, chief engineer for the State Road Commission, reports that approximately $5,000,000 is expected to be available for Utah's 1941 road program. Highway construction will account for $2,550,000 of this total with maintenance taking an estimated $1,500,000, leaving $950,000 for other highway department expenditures.

● (1) Idaho constructs a 334-foot concrete arch to carry the Yellowstone Trail highway over the Coeur d'Alene River at Wallace. (2) U. S. 31 W near Fort Knox, Kentucky, passes through a 110-foot rock cut. (3) Completed section of Montana's reconstructed mixed-in-place highway U. S. 91 between Helena and Butte. (4) One of the heaviest grading jobs completed by Kansas in '40 was on this Russell County road. (5) Section of divided lane highway on U. S. 50, Jackson County, Missouri.

The $2,550,000 sum for construction covers a proposed 80 miles of grading involving 3,000,000 yards of material, $1,300,000; 70 miles of gravel or crushed stone requiring 1,000,000 tons of material, $450,000; oil treatment on 50 miles, 1,500,000 gals., $150,000; 14 miles of concrete paving, 180,000 square yards Portland Cement pavement, $350,000; and 15 bridges totalling $300,000. In addition, $200,000 in highway excavation involving 1,000,000 yards awarded in 1940 will be carried over into 1941.

Federal funds account for $1,525,000 of the $5,000,000 total, $1,125,000 being regular Federal Aid funds, and the $400,000 balance other Federal funds. $3,800,000 will be furnished from state gas tax revenue. Motor vehicle license fee receipts are used to retire state road bonds, the remainder being distributed between cities, towns and counties for roadbuilding purposes.

During 1940 the state spent approximately $300,000 to purchase equipment, and paid $327,000 for equipment rental.

No state highway funds were diverted to other uses, Mr. Knowlton reports.

Vermont

Appropriations for Vermont's department of highways will not be made until the state legislature meets this month. Figures for the 1941 program all consequently not available at present, but the 1940 allotments give a detailed account of the $1,795,361.57 spent on construction during the past year.

	Miles	Amount	Quantities Required
Grading (This mileage includes all projects under "a" and "b")	71.028	$636,327.75	2,344,863 Cu. Yds.
Surfacing—			
Gravel or crushed stone	1.305	2,781.70	3,341 Gallons
Oil treatment (double tack coat)	49.427	58,347.30	408,150 Cu. Yds.
Paving, high type (concrete pav't)	3.250	76,377.50	7,195 Tar or CBA Gallons
Paving, low type	21,998	54,527.13	427,957 Gr. or Stone Cu. Yds.
(mixed-in-place)		82,099.75	19,044
Bridges—34—cost		332,693.47	

In addition, 891,464 yards of excavation will be carried over into 1941 at an already-awarded price of $225,051.90.

State gas tax funds of $2,120,000 plus regular Federal Aid funds of $795,361.57 were principal sources of revenue for the 1940 program. An estimated $43,000 was spent on equipment purchases during the year.

Virginia

An increase of $2,095,159 over 1940 budget totals is forecast in the figures reported by C. J. Allard, highway department auditor, which show a total of approximately $30,790,000 available for all roads in the state during 1941.

Regular Federal Aid funds of $2,503,000 plus state gas tax revenues of $19,845,000 and $8,442,000 from license fees and other income sources make up the total.

Allocation of 1941 funds will be approximately as follows:

Construction—primary system	$13,630,161.00
Maintenance—primary system	2,181,794.81
Maintenance—secondary system	3,073,191.78
Construction and improvements—secondary system	5,426,808.22
Improvements—primary system	2,818,205.19
City streets	678,000.00
Other	2,981,839.00
	$30,790,000.00

Figures for the division of 1941 construction funds were not available at press time.

Equipment purchases in 1940 totalled approximately $300,000.

Washington

Data furnished by H. G. Porak, plans and surveys engineer for the Department of Highways, estimate $11,700,000 will be available for 1941 highway work. Of this total approximately $7,000,000 is earmarked for construction work, $3,800,000 for maintenance and the $900,000 balance is for other highway department expenditures.

Regular Federal Aid funds will make up $1,573,000 of the above total with an additional $596,500 in other Federal funds. State gas tax revenues will contribute $6,740,000, and $2,795,000 will be supplied from vehicle license fees and other income. Of the $7,000,000 in proposed construction work, it is estimated that 64% will be devoted to gravel or crushed stone grading and surfacing, 10% to low type paving and oil treatment, 14% to high type paving and 12% to bridges.

$1,100,000 in highway excavation work awarded in 1940 and involving 1,500,000 cu. yds. will be carried over into 1941.

During 1940, the state spent $224,860 for equipment purchases which does not cover equipment used on contract work.

Among the outstanding highway projects proposed for 1941 are: grading and paving 14 miles of four-lane highway on Primary State Highway No. 1 between Woodland and Salmon Creek; grading 4 miles of four-lane highway on Primary State Highway No. 1 between Longview Wye and Ostrander; and grading, surfacing and paving four-lane highway 13 miles between Issaquah and North Bend.

West Virginia

West Virginia's anticipated construction during 1941 is estimated by officials to total $7,986,100 on the primary road system and $1,540,200 for secondary construction. Maintenance is expected to run about the same as 1940, during which allocations for primary system maintenance totalled $2,-

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● **Elimination of a narrow subway and widening of the approach to Cheyenne on U. S. 30 was Wyoming's outstanding highway project for 1940.**

700,0000 and for the secondary system, $2,900,000.

Major items in the 1941 construction program are:

PRIMARY SYSTEM

	Miles	Amount
Now programmed for contract:		
Grading and draining	32.0	$1,028,600
Grading, draining & concrete paving	16.0	1,130,000
Grading, draining, macadam & bituminous paving	21.0	757,600
Concrete paving	.2	12,000
Macadam and bit. paving	13.0	177,500
Bridges—13—Cost		805,000
Suggested for contract program:		
Grading and draining	18.0	425,000
Grading, draining & concrete paving	10.0	490,000
Grading, draining, macadam & bituminous paving	8.0	280,000
Bituminous surfacing	200.0	600,000
Bridges—12—Cost		500,000

SECONDARY SYSTEM

	Miles	Amount
Now programmed for contract:		
Grading and draining	3.5	$ 50,000
Grading, draining, macadam & bituminous paving	22.8	223,500
Macadam and bit. paving	2.9	32,500
Bridges—6—Cost		144,200
Suggested for contract program:		
Grading and draining	20.0	400,000
Bituminous surfacing	200.0	400,000
Bridges—10—Cost		200,000

Wisconsin

Estimates on funds available for Wisconsin's 1941 highway work are not possible to forecast at this time. Details on the state's 1940 program, however, show that the past year's total of funds expended was $30,700,000, of which approximately $6,500,000 was spent on maintenance, and $21,200,000 was used for other expenditures including all aids paid to local governmental units in accordance with state statutes.

Financing of the 1940 funds included $1,200,000 in regular Federal Aid and $1,000,000 in other Federal funds, $20,100,000 from state gas taxes and $12,900,000 from license fees and other state income.

The 1940 construction program, based on contracts awarded and day labor permits approved during the year, was as follows:

	Miles	Amount	Quantities Required Cu Yds.
Grading	95	$1,200,000	6,500,000
Surfacing—			
Gravel or crushed stone	120	850,000	385,000 Sq. Yds.
Bitum. Surface	220	240,000	
Concrete surface	56	1,620,000	710,000
Structures		1,500,000	
Miscellaneous		90,000	

About 2,500,00 yards of highway excavation awarded at approximately $600,000 will be carried over into 1941.

Wyoming

Barring any unforeseen contingencies which may arise in connection with defense highway financing, Wyoming's 1941 highway program will proceed on practically the same basis that it has in previous years. Funds for construction which are anticipated to be available will amount to approximately $3,600,000; $1,700,000 coming from Federal Aid, and the remainder coming from state road users' fees, principally the gasoline tax.

It is expected that the normal construction program will be continued, giving emphasis to the construction of secondary or feeder roads, the construction of the main through highways, and the construction of some mileage to be added to the existing state highway system. About 180-200 miles of grading, drainage, and bridge work will be included, as well as between 100-150 miles of oil mat surfacing.

Quite a large amount of the funds will go for placing thin armor coats composed of stone chips on previously constructed highways.

During 1940 the department accomplished over a million dollars worth more of construction work than in the previous year. This was not due to any increased funds made available, but by speeding up the preparation of plans, the collection of road users' fees, and savings in maintenance accomplished by certain changes in the department organization.

For your convenience in writing to The Owen Bucket Co., you will find a card bound in this issue.

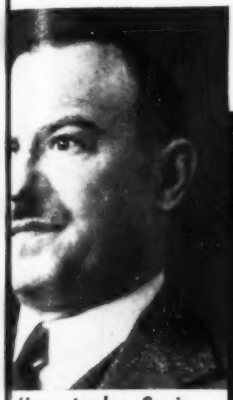
These Men Have a Message for YOU!

H. G. Sours, President, ...kan Road Builders Association.

General Robt. Lee Bobbitt, of the Texas Highway Commission, will tell you how roads behave under military transport.

A. T. Goldbeck, Secretary of the Crushed Stone Association will discuss non-rigid pavements for airport service.

Prof. Walter Sadler of the University of Michigan brings you valuable data on the "Pitfalls of Bidding".



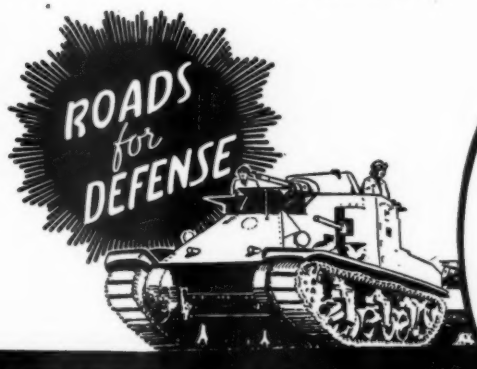
...Hogentogler, Senior ...way Engineer of the ...c Roads Administra... will tell you about ...eering and construc... control on highway ...nkments.

T. E. Stanton, materials Engineer, of the California Division of Highways, will discuss practices in the control of moisture in embankments and stabilized bases.

Capt. H. C. Whitehurst, Director of Highways for the District of Columbia, brings you a message on that coming new subject "City Street Maintenance by Contract".

Another new subject of heavy interest. H. H. Houk, Engineer of Washington National Airport, Civil Aeronautics Administration, will discuss airport engineering and the highway engineer.

...l. Williams, Engineer ...er of the Ionia Coun... Commission, Ionia, ...will go into the impor... ...hase of legislation, ... and administration.



SPACE precludes our going into further details. These are but a few of the many topnotchers that are going to discuss many subjects pertinent to the problems of contractor and highway official alike. H. F. LaGuardia, Mayor of New York, Gen. Fugua, N.B.C. War Analyst, Frank Nikirk of the Caterpillar Tractor Co., E. E. Duffy, Francis J. Kelly, W. H. Seymour, H. F. Clemmer, are but a few of the many more that will discuss in detail the many things that affect your jobs. Don't miss it — *there will be interesting inspection trips, motion pictures, open discussion — fun! Make your reservation now. . . .*

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Construction Reaches New High

(Continued from page 33)

program is expected to dominate this year's activities, to run to very large volume during the first half of the year and to carry a distinct possibility of enlargement if additional appropriations are made by the next congress. Concurrent with large amounts of army, navy, air corps, defense industry and defense housing construction, continually increasing industrial production activity and industrial employment are anticipated, with stimulating effects on national income and private building demand (commercial, manufacturing, and residential buildings and electric utility construction). Translation of this potential private demand into actual building and engineering contracts will hinge upon two important factors:

1. Whether potential construction industry capacity is adequate to carry the double load of largely increased public and private demand.

2. Whether building cost increases remain within reasonable bounds.

Temporary local shortages of certain classes of materials and certain categories of skilled labor are likely to occur, particularly during the peak period of cantonment building. Such conditions may very well cause temporary deferment of some private building projects and even of some defense housing projects. No extended period during which private building would have to be long deferred or abandoned as a direct result of government priorities is anticipated for 1941.

More uncertain, according to Dodge, is the prospect for stable building costs. It is pointed out, however, that while market demand factors tend strongly in the direction of the building cost inflation which has always in times past accompanied armament and war programs, consciousness of the disastrous effects of price inflation upon the whole economy is today keener and more widespread than ever before and efforts to exert all possible controls will be applied by leaders in industry, labor, and government. Recent analysis indicates a probability that building cost increases will remain within moderate bounds during most, if not all, of 1941.

Dodge estimates include, in detail, the following items: non-residential building volume in the 37 eastern states, $1,400,000,000 in 1941 compared with $1,200,000,000 in 1940, an estimated increase of 17 per cent; residential building volume, to increase from $1,530,000,000 this year to $1,700,000,000 in 1941, an indicated rise of 11 per cent; public works and utilities construction, to increase from $1,120,000,000 in 1940 to $1,300,000,000 next year. These estimates anticipate the largest volume of public building and engineering work on record, coupled with a moderate increase in private construction.

"Public money ought to be touched with the most scrupulous conscientiousness of honor. It is not the produce of riches only, but of the hard earnings of labor and poverty. It is drawn even from the bitterness of want and misery. Not a beggar passes, or perishes in the streets, whose mite is not in that mass."—*Thomas Paine*

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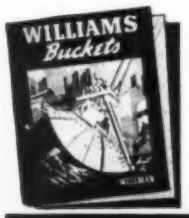

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ARKANSAS, LITTLE ROCK: Lyons Machinery Company.
CALIFORNIA, LOS ANGELES: Crook Company, 2900 Santa Fe Avenue, Phone Kimball 5137.
*SAN FRANCISCO: Bucyrus-Erie Company, 390 Bayshore Blvd. Phone Atwater 2341.
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HARRISBURG: Beckwith Machinery Co., 635 N. Cameron St. Phone 4-4064.
KINGSTON: Beckwith Machinery Co., 249 Market St.
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PITTSBURGH: Beckwith Machinery Co., 6550 Hamilton Ave. Phone Montrose 4300.
TENNESSEE, KNOXVILLE: Brooks Equipment & Mfg. Co., 408-10 Davenport Rd.
MEMPHIS: Road Builders Equipment Co., Third and Calhoun Sts.
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ABILENE: R. B. George Machinery Co.
DALLAS: R. B. George Machinery Co., 1135 S. Lamar St.
EL PASO: Tri-State Equipment Co., 500 E. Overland Ave.
HOUSTON: Gulf Tractor & Equip. Co., 3100 Polk Ave.
PECOS: Tri-State Equipment Co.
SAN ANTONIO: Wm. K. Holt Machy. Co., West Harding Rd.
TYLER: R. B. George Machinery Co.
UTAH, SALT LAKE CITY: The Lang Co., 267 N. First St.
VERMONT, BARRE: Reynolds & Son, Inc.
VIRGINIA, RICHMOND: Virginia Tractor Co., Inc., 1628 W. Main St.
WASHINGTON, SEATTLE: Clyde Equipment Co., 3410 First Ave., South.
*SEATTLE: Bucyrus-Erie Co., 3408 First Ave., So. Phone Main 6424.
SEATTLE (for Alaska): Northern Commercial Co., 419 Colman Bldg.
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WEST VIRGINIA, CLARKSBURG: General Equip. Co., Inc., 414 N. Fourth St.
HUNTINGTON: Chas. S. Porter Supply Co., 424 Fourth Ave.
WISCONSIN, MILWAUKEE: W. L. Hartley, 2446 N. 62nd St., Wauwatosa, Wis.

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BRITISH COLUMBIA, VANCOUVER: Finning Tractor and Equip. Co.
MANITOBA, WINNIPEG: Kipp-Kelly, Ltd., 68 Higgins Ave.
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QUEBEC, MONTREAL: F. H. Hopkins & Co., Ltd., 340 Canada Cement Bldg., Phillips Square. Phone Plateau 1136.

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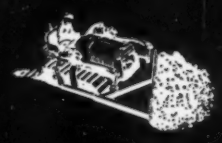

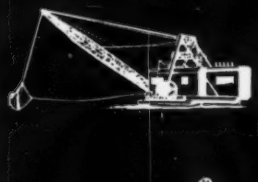
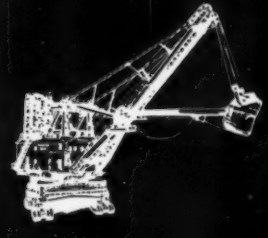
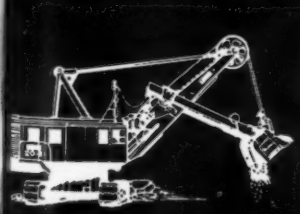
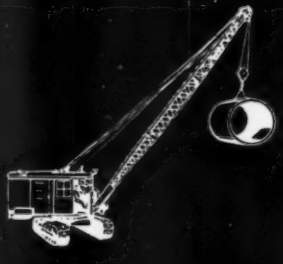
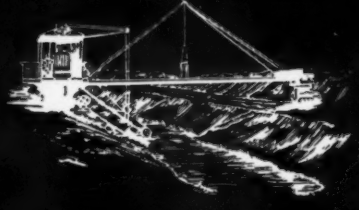

Notes from the manufacturers

John A. Roebling's Sons Company, Trenton, New Jersey, recently announced the appointment of W. K. Hanna as manager of their Pittsburgh territory. He entered the Roebling organization in 1919 and served as sales representative in southwestern Virginia and southern West Virginia. He later served as assistant manager of the company's Philadelphia branch, a position which he held until his present appointment.

Carboloy Co., Inc., Detroit, has appointed Sprage and Henwood, Inc., Scranton, Pa., and E. J. Longyear Company, Minneapolis, Minn., as sales agents for the newly introduced Carboloy "Sinta-Set" diamond impregnated core-bits. The new core-bits have been under development in the field for some time but have only recently been released for commercial sale.

General Electric Company, Schenectady, New York, recently made two new appointments. Leonid A. Umansky was named assistant manager of the industrial engineering department and Francis Mohler was appointed engineer of the steel mill section. After graduating from the Polytechnic Institute of Petrograd, L. A. Umansky joined the Schenectady works in 1919 and has been with General Electric ever since. F. Mohler received his education at the Virginia Polytechnic Institute and upon his graduation in 1926 he joined the General Electric Company as test man.

Sullivan Machinery Company, Michigan City, Indiana, announces the appointment of The Bergstrom Steel Company, Ltd., of Los Angeles and Oakland, California, as distributors for their detachable rock drill bits. The Bergstrom Steel Company will handle a complete line of bits and are fully equipped to make and supply detachable bit rods and to resharpen bits.

Caterpillar Tractor Co., Peoria, Illinois, has announced two advancements in the company's organization. Donald A. Robinson has been made a vice-president of the company with administrative direction of all selling and advertising activities. The office of general sales manager, which he leaves, is being filled by the advancement of Gail E. Spain.

Westinghouse Electric & Manufacturing Company, according to an announcement by T. I. Phillips, general works manager, has appointed M. L. Fawcett as staff assistant. Since 1935 he has served as manager of the transformer division.

Worthington Pump and Machinery Company, Harrison, New Jersey, have named R. A. Travisano as traffic manager, succeeding the late H. T. Smith. He entered the employ of Worthington in 1912 and has worked in both the local and general traffic departments.

Iron & Steel Products, Inc., Chicago, Illinois, dealers in used iron or steel commodities, announce that Irvin A. Ruder is now managing the Merchant Iron and Steel portion of this business.

The Rawlplug Company, Inc., 98 LaFayette St., New York, N. Y., have just opened a new Rawlplug branch known as Rawlplug-New Orleans Co., 918 Union St., New Orleans, La., in charge of Joe E. Muniot, Jr. A complete stock will be carried there.

Hobart Brothers Company, Troy, Ohio, have appointed A. C. Harvey Company, Allston, Massachusetts, who have been identified for years with the sale of steel products and welding equipment, as jobbers of the line of Hobart "Multi-Range" arc welders, to collaborate with Leo Gordon of the New England distributing office.

Direct Subway Entrance to all Points of Interest

New York's Popular

HOTEL

LINCOLN

44TH TO 45TH STS. AT 8TH AVE.

OUR CHOICEST ROOMS From $3

1400 ROOMS each with Bath, Servidor, and Radio.

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PRESIDENT

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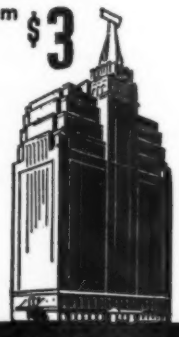
SAME OWNERSHIP



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WON'T QUIT
OR CAUSE TIME OUT

A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

THE HAYWARD COMPANY
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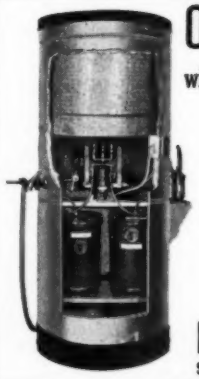

Oil Users - Savings Plus

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1—Filters lubricating oil of any quality or grade from either gasoline or diesel engines.

2—Returns up to 90% of your used crankcase oil ready for re-use.

3—Saves from 60 to 80% on your oil cost.

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Positions wanted advertisements will be run under this heading for 5 cents per word, minimum charge $1.00. Advertisements for help wanted free of charge.

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BLAST HOLE DRILL OPERATOR

Blast hole drill operator, 10 years' experience on gas, diesel and electric, large and small machines. Can do own repair work. Middle age, single and willing to go anywhere in U.S.A. Excellent references. Box 9160

EXPERIENCED OPERATOR

Operator with fifteen years' experience on gasoline and diesel powered shovels, draglines, and crane-clamshell machines on highway and sewer construction jobs desires steady work anywhere. Preference: Northwest shovel or dragline about 2 yard capacity. Can do own repair work. References furnished. Age 32. Married. Now located in Missouri. Box 9159

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With 20 years' experience of concrete work on all kinds of buildings, bridges, highway roads. Will go anywhere in United States. Best reference. Box 9165

BLAST HOLE DRILL OPERATOR

Three years' steady employment on Loomis Clipper "44", Cyclone piston type 1200-G and Bucyrus-Armstrong 27-T and 42-T, gas and electric blast hole drills on Penna. anthracite coal field. Able to make repairs. Unmarried. Age 39. Now located in Pennsylvania; willing to go anywhere. Can furnish best of references. Wants steady job on any blast hole drill; preference Armstrong. Box 9161

ALL-AROUND OPERATOR

Can operate any kind of machine, large or small. Can do own repair work. Have had experience in quarry, ore and coal stripping; familiar with grading work. Can operate steam, diesel, gas or electric. Would like steady employment on large-scale operation. Will furnish references. Box 9164

CABLEWAY OPERATOR

Experienced slackline cableway operator wants work operating slackline or dragline. References.

Tom N. Hudson
Route 4, Boone, Iowa

New trade literature

Title: **"The Lincoln Weldirectory"**
Subject: Procedures for producing all types of welds in mild steel, for welding all metals used to any extent industrially and for applying surfacing metal to meet any type of wear-action in service. Fifty-eight pages, 165 illustrations including photos and drawings.
Where to Get: Lincoln Electric Company, Cleveland, Ohio. Free upon request.

Title: **"The Bit That Holds Its Gauge"**
Subject: Improved detachable bits, their design, manufacturing process, claims, types and sizes are covered in this new bulletin.
Where to Get: Sullivan Machinery Company, Michigan City, Indiana. Free upon request, ask for bulletin 87-G.

Title: **"Report of Investigations 3533"**
Subject: Report, listing all explosives and blasting devices which were permissible on June 30, 1940, for use in coal mines. Thirty-four additional brands of explosives have been placed on the active permissible list while 25 explosives became inactive. Also included are the details as to the permissible conditions governing the use of nine different models of blasting device.
Where to Get: Bureau of Mines, Department of the Interior, Washington, D. C.

Title: **"Roebling Rubber Covered Wires and Cables"**
Subject: Thirty-five page book confined to a description of building wires and service entrance cables. Also included is a complete list of all other Roebling products.
Where to Get: John A. Roebling's Sons Company, Trenton, New Jersey. Free upon request.

Title: **"Practical Pumping Problems and How They Are Solved"**
Subject: Illustrated booklet containing comprehensive information on pumps and pump parts. Discussed in detail are the uses of Monel, "K" Monel and "S" Monel for pump parts and the choice of suitable materials for pumps handling a variety of corrosives in a wide range of industries.
Where to Get: The International Nickel Company, 67 Wall Street, New York, N. Y. Free upon request.

Title: **"Quick Selector Catalog"**
Subject: Safety switches, "No-Fuze" breakers, multibreakers, distribution panelboards, motors, and motor controls are featured in successive sections with time-saving section index on the front cover. Profusely illustrated. Contains 64-pages.
Where to Get: Dept. 8-N-48, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pennsylvania. Free upon request.

Title: **"High-Speed Synchronous Motors"**
Subject: Featuring detailed information about their "900 Series" synchronous motors, this new publication also contains data on the complete line of this type motor manufactured by General Electric.
Where to Get: General Electric, Schenectady, New York. Free to those requesting form GEA 3434.

Title: **"Sixteen-inch Lathes"**
Subject: Descriptive and illustrative catalog on three types of 16" series "S" South Bend precision lathes. Attachments for tool-room production

Photo by Courtesy of the Sterling Motor Truck Co.

A COMPARATIVE JOY RIDE

THE Harrison Construction Co. of Pittsburgh finds the speedy movement of this monster Lorain shovel on their Trailer a joy ride in comparison with older methods or less advanced equipment.

ROGERS' TRAILER

This completely electrically welded trailer is thoroughly engineered to withstand every possible strain including terrific overhanging loads like this one.

Four rear axles oscillate longitudinally and transversely to distribute the load over sixteen tires and Patented equalizing brakes afford safety of control under all conditions.

There is a Rogers trailer for every requirement.

ROGERS BROTHERS CORPORATION
136 Orchard St. Albion, Penna.

EXPERIENCE *builds them* PERFORMANCE *sells them*

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and maintenance work are described, and features of construction are outlined.
Where to Get: South Bend Lathe Works, 425 E. Madison St., South Bend, Indiana. Free upon request, ask for Catalog No. 16-T.

Title: **"The Tournapull Method"**
Subject: Long haul, high-speed earthmoving over truck haul distances is told and graphically illustrated along with actual job data. Contains complete equipment specifications and description of the three Tournapull sizes.
Where to Get: LeTourneau — "Caterpillar" dealer or R. G. LeTourneau, Inc., Peoria, Illinois. Free upon request.

Title: **"Simplex Jacks"**
Subject: Vest pocket, 60-page catalog. Fully describes the construction, application and gives specifications for the 300 plus sizes and types of Simplex jacks.
Where to Get: Templeton, Kenly & Company, Chicago, Illinois. Free upon request, ask for catalog No. 40.

Title: **"Portable Compressors"**
Subject: Bulletin illustrating and describing gasoline engine driven portable compressors and type UPW Rockmaster. Specifications also included.
Where to Get: Worthington Pump and Machinery Corporation, Harrison, New Jersey. Free upon request, ask for bulletin H-850-B52B.

Title: **"Information on Vibro-Insulators"**
Subject: Applications of Vibro-Insulators, the combination of rubber and metal which is used to eliminate vibration, are listed and illustrated in the B. F. Goodrich Company's recent bulletin.
Where to Get: The B. F. Goodrich Company, Akron, Ohio. Free upon request.

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These shovels will not be sacrificed but you can avail yourself of an excellent honest value on either one. Box 2676

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LORAIN MODEL 55 1-yd. Gas shovel. Waukesha engine. Electric starter. Operating condition. Located western Wisconsin. Box 2664

INSLEY Model R ½-yd. Gas Dragshovel. Electric Starter. Good Operating Condition. Located Oregon. Box 2644

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